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HUGHLINGS JACKSON ON APHASIA AND KINDRED AFFECTIONS OF SPEECH.

BY HENRY HEAD, M.D., F.R.S.

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TOGETHER WITH A COMPLETE BIBLIOGRAPHY OF DR. JACKSON'S PUBLICATIONS ON SPEECH, AND A REPRINT OF SOME OF THE MORE IMPORTANT PAPERS.

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CHAPTER I.—INTRODUCTORY.

IT is generally conceded that the views on aphasia and analogous disturbances of speech found in the text-books of to-day are of little help in understanding an actual case of disease. The tendency to appear exact by disregarding the complexity of the factors is an old failing in medical history. Each patient with a speech defect of cerebral origin is stretched on the procrustean bed of some theoretical scheme: something is lopped away at one part, something added at another, until the phenomena are said to correspond to some

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diagrammatic conception, which never has and never could have existed. And yet neurologists continue to cling to these schemes, modifying them to suit each case, conscious that they do not correspond in any way to the facts they are supposed to explain.

The ground has been worked over again and again to such an extent that it is difficult for the modern student of neurology to throw himself back to the 'sixties, when the subject of speech defects was virgin soil. But of late years dissatisfaction with the current dogmas, manifest in such a revolt as that of Pierre Marie, has driven more thoughtful neurologists back to the earlier work on aphasia. We have become lost in a maze of subtleties, and in attempting to find a new line of advance have groped our way back to the beginning.

Hughlings Jackson was one of the most remarkable pioneers in the field of defects of speech caused by cerebral disease. Between 1864 and 1893 he published a series of papers on this subject, and throughout the whole of this period he would enunciate his views to anyone who visited the wards of the National Hospital. But even amongst the younger men his aphoristic dicta fell upon deaf ears. Until a year ago, when Arnold Pick dedicated "Die agrammatischen Sprachstörungen" to "Hughlings Jackson, the deepest thinker in neuropathology of the past century," no one attempted to understand his contribution to the subject. Moutier mentions his name along with those of other Englishmen who held more popular views, not knowing how closely Hughlings Jackson's conceptions agreed with those of Moutier's master, Pierre Marie. Von Monakow mentions four only of Hughlings Jackson's papers amongst over 3,000 which form the references at the end of his volume on "Die Lokalisation im Grosshirn," and there is nothing in the text to show that he has understood Jackson's point of view or has recognized how completely he stood outside the popular conceptions.

Four reasons may be offered for this extraordinary neglect of Jackson's work. Dr. Hughlings Jackson was a man of such profound personal modesty that he laid little value on the publication of his views, although firmly convinced of their utility in explaining the phenomena of disease. Thus most of his papers are to be found in Journals which are not accessible to foreigners, and many cannot be consulted even by English workers except in the great medical libraries.

Secondly, the style in which they are written makes them peculiarly difficult to read. He was so anxious not to overstate his case that almost every page is peppered with explanatory phrases or footnotes,

so that the generalization can scarcely be distinguished from its qualifications. English students, accustomed to the fluent facility of his contemporaries, turned away from the bristling difficulties of Hughlings Jackson's papers.

Thirdly, Jackson derived all his psychological knowledge from Herbert Spencer, and adopted his phraseology almost completely. This has tended to alienate psychologists, blinding them to the truths underlying this somewhat uncouth nomenclature. In this paper I shall keep as closely as possible to Hughlings Jackson's phraseology, and shall not translate it into more modern terms except where obsolete conceptions adopted from others seem to obscure valuable observations.

Finally, the nature of the ideas he propounded was foreign to the current views of the day. He was always accustomed to say that "it generally takes a truth twenty-five years to become known in medicine," a dictum certainly founded on his personal experience. Each generation of house physicians and clinical clerks at the National Hospital passed out impressed by the beauty of his character and his simple-hearted sincerity. Some carried away with them one or more of his broad generalizations to bear fruit in their subsequent work. Thus, for instance, his doctrine that "destructive lesions never cause positive effects, but induce a negative condition which permits positive symptoms to appear," has become one of the hall-marks of English neurology.

But no one assimilated his views on defects of speech and applied them to a series of actual cases of this condition. We failed to appreciate how much closer these conceptions would lead us to the phenomena of aphasia than the glib generalities founded on the anatomical facts of cortical localization.

Although the study of the phenomena of aphasia is one method of elucidating the mechanism of speech, it is by no means the only one. In the last forty years philologists, psychologists, and students of philosophy have steadily progressed away from the conceptions expressed by neurologists, even in their most recent monographs and text-books. Neurology has become frozen stiffly in the grip of pseudo-metaphorical classifications which neither explain the conditions nor correspond to the clinical facts. The dangers of such false classification were recognized by Jackson in 1878; "We must not," he said, "classify on a mixed method of anatomy, physiology and psychology, any more than we should classify plants on a mixed, general, and empirical method as exogens, kitchen herbs, graminaceæ and shrubs" [p. 115].

By an irony of fortune the advance of knowledge, in other than

neurological fields, has resulted in attainment of a position in many ways corresponding closely with that held by Jackson more than five-and-thirty years ago. This has induced us to republish the most important papers of Hughlings Jackson on Defects of Speech, together with such fragments from other publications as may seem of value at the present time. A bibliography, as complete as possible, has been appended with a short account of the contents of each paper. Thus we hope to enable others to recognize the foresight of Jackson's views on speech and to assist subsequent workers to make further advance along the lines he has indicated.

Chapter II.—Hughlings Jackson's Method of Studying Affections of Speech.

Throughout the whole of his work on affections of speech Hughlings Jackson insisted on the necessity of studying and classifying the phenomena before any attempt was made to correlate them with morphological changes. Speech is a function of mental activity; and however much that mental activity may ultimately be linked up with the integrity of some portion of the brain-substance the problem is primarily a psychological one. "We shall, to start with, consider our subject empirically and afterwards scientifically. We first arbitrarily divide and arrange for convenience of obtaining the main facts which particular cases supply, and then try to classify the facts in order to show their true relations one to another, and consider them on the psychical side as defects of mind and on the physical side as defects of the nervous system" [p. 112].

Every worker on the affections of speech has claimed to deal with the "facts" of each case; but no one except Jackson has recognized that all the phenomena are primarily psychical and only in the second place susceptible of physiological or anatomical explanation. Even the most modern accounts, such as that in v. Monakow's monograph, attempt to deal with the clinical facts as if they could be deduced from the physiological activity of morphological centres. A visual centre or an auditory centre demands a visual or auditory aspect of affections of speech, and attempts are made to classify the psychical phenomena as a direct expression of the activity of such centres. Still greater chaos was introduced by the theory that affections of speech were due to destruction of morphological "visual psychic" or "auditory psychic"

centres. Here we are, indeed, in the middle of that confused classification against which Jackson uttered a solemn warning in 1878.

This attempt to deduce the clinical phenomena of affections of speech, and to rearrange them in harmony with morphological centres, went on apace between 1864 and 1890, until at last the honest observer was obliged to confess that no actual case he had ever seen corresponded to any one of these categories. Then each phenomenon received its name, and a case was said to be one of "amnesia verbalis" with "agnosia tactilis," some "word-blindness," "echolalia," and "anarthria." All these descriptive expressions and a host of others were given a nosological place, and attempts were made to attribute them to loss of function in some morphological centre of the cerebral cortex.

But as far back as 1868, when Jackson took part in the discussion on Broca's paper at the Norwich Meeting of the British Association, he recognized the law that a destructive lesion can never be responsible for positive symptoms; pure destruction produces negative effects, and any positive symptoms are the consequence of the released activity of lower centres. This general law of nervous activity he applied rigidly to the phenomena of affections of speech.

"To say that the disease 'caused' these (abnormal) utterances, a positive condition, is absurd, for the disease is destruction of nervous arrangements, and that could not cause a man to do something; it has enough to answer for in leaving him unable to speak. The utterances are effected during activity of nervous arrangements which have escaped injury. This remark may seem a truism here, but in more complicated cases it is very common to hear of positive symptoms being ascribed to negative lesions, to loss of function of nervous elements. It is common, at any rate, for disease to be thought of vaguely as something 'disordering the functions of the brain.' . . . It is an error to ascribe such positive symptoms as the recurring utterances of speechless men, the erroneous words uttered by those who have defect of speech . . . . &c., to loss or to defect of function. These positive mental symptoms arise during activity of lower centres or lower nervous arrangements which have escaped injury" [pp. 154, 155].

Every case of affection of speech exhibits, therefore, two sides—the negative and the positive; on the one hand, the patient may not be able to speak, to write, or to read, and expression by signs may be impaired. This is the negative aspect, whilst his power of writing his signature, and of swearing, or uttering other emotional expressions, form the positive symptoms, and are the expression of lower mental activities.

Some critics have imagined that Jackson's ideas were built up on a priori reasoning; but anyone who will attempt to examine a case of aphasia according to his conceptions will find himself led to the discovery of phenomena which will elude any other more theoretical method. He will discover in many cases that it is impossible to say that a man can or cannot speak; for he can utter a phrase or a word which he cannot repeat to order. He can write his name and address, but not that of his mother with whom he lives. He may understand all ordinary commands to fetch this or that object, but told to close his eyes, opens his mouth. He may not be able to draw a square or a triangle, but draws an elephant without difficulty. The "golden rule" upon which Dr. Jackson insisted—"Put down what the patient *does* get at and avoid all such terms as amnesia, &c.," had it been habitually followed, would have saved neurologists from many years of wandering in the wilderness.

Jackson's attitude was strictly phenomenal. He never deduced his observations from his hypothesis, but any hypothesis he enunciated sprang, as it were, ready made from some clinical fact. He never experimented or arranged a series of observations to elucidate a definite point. He stood like an observer on a bridge formulating the extent of the flood from matter carried down by the stream. The acuteness and rapidity of the conclusions he drew from some minute indication made his slower-witted companions believe that he had produced the hypothesis from his inner consciousness; whereas, in truth, the view he enunciated was the direct outcome of some phenomenon accurately observed and carried to a strictly logical conclusion.

He did not choose those cases which exhibited the most perfect conditions for experimental observation; he would watch a patient in the throes of delirium tremens as he tossed in the padded room, or listen to the laughter of a man with pseudo-bulbar paralysis, or the recurrent utterance of some partly demented aphasic, and from such observation would spring the luminous exposition of a principle. We did not see how much closer he was to the clinical facts than those who talked glibly of "centres" for psychical processes.

He never failed to recognize that the phenomena of aphasia did not stand alone; they illustrated the same principles and were governed by the same laws as other functions of the nervous system. Above all, he insisted on the importance of remembering that dissolution occurred first in the most highly organized products of neural or mental activity, leaving the more lowly at liberty to express themselves freely in the resulting symptoms.

"The consideration of such facts will help us to classify the phenomena of cases of aphasia on a deeper basis than that of language. To use an expression somewhat loose in this connexion there is loss of certain voluntary actions in some cases of aphasia with conservation of the more automatic—a dissolution affecting more than language processes, and affecting language processes not so much as language processes but as they are some of the voluntary actions. We have to consider speech on this wider basis in order that we may be better able to see how speech is part of mind, and to get rid of the feeling that there is an abrupt and constant separation into mind *and* speech" [p. 168].

Chapter III.—Classification of Affections of Speech.

Dr. Jackson's first clinical lecture in the London Hospital Reports for 1864 was devoted to the classification of defects of speech. He laid stress on the importance of separating articulatory difficulties due to paresis of tongue, lips, or palate from true affections of speech. He pointed out that patients with speechlessness due to such paralysis could write, but had difficulty in swallowing, whilst aphasics, who could neither speak nor write freely, could swallow perfectly.

Somewhat later he described cases of speech defect where the patient could not protrude the tongue on being commanded to do so, but could use it perfectly in all such automatic movements as licking his lips [pp. 37, 48 and 104].

In 1868 the British Association for the Advancement of Science held its annual meeting at Norwich, and M. Broca opened a discussion on aphasia; he was followed by Dr. Jackson. Unfortunately no full record of this paper is extant, for the official record gives the names only of the speakers; but a synopsis appeared in the *Medical Times and Gazette* from which we can obtain some knowledge of the views expressed by Dr. Jackson [p. 59].

"Healthy language" he said, "could be divided into two distinct forms which may be separated by disease.

"(1) Intellectual, i.e., the power to convey propositions.

"(2) Emotional, i.e., the ability to exhibit stress of feeling.

"Intellectual language suffers throughout not only in its most striking manifestations such as words, but also in writing and sign-making. It is the power of intellectual expression by 'movements' of any kind which is impaired, those most special as of speech, suffering most; those of simple sign-making least or not at all.

"Emotional language is conserved throughout not only in its most striking manifestations by variations in voice, but in smiles, &c., and in its more simple manifestation by gesticulation."

Here he strikes the note which sets the key of all his subsequent work. Speech, apart from its articulatory aspect, is double, consisting of intellectual and emotional language, and it is the former that is usually disturbed in consequence of cerebral disease. What, then, is the special nature of these defects of intellectual language? Jackson pointed out that patients with affections of speech fell into two groups.

"Class 1.—Severe cases in which the patient is speechless or nearly so, or in which speech is very much damaged." In the worst of these cases the patient can only utter some one unvarying word or two words or some jargon.[1]

"Class 2.—Cases in which there are plentiful movements, but wrong movements, or plenty of words but mistakes in words." In this class the phenomena show that speech suffers in proportion to the mental complexity of the task the patient is asked to perform. He is not wordless, and knows what he wants to say; but he uses wrong words, has difficulty in consecutive exposition both by word of mouth and writing and his speech may be reduced to a jargon. The extent to which all these defects are manifested at any moment depends on the nature of the mental processes necessary to the successful carrying out of the task.

Then he asks "what is the degree of intelligence these patients have?" and expressly guards himself against any implication that language and thought exist separately. "The question," he says, "is not How is general mind damaged? but What aspect of mind is damaged?"

(*a*) Sign-making is least affected, sometimes seeming to escape altogether.

(*b*) Writing suffers more or less in nearly every case of defect of speech from disease of the hemisphere, but varies as much as the defect of speech itself does. "Indeed writing, and we may add reading, is the same defect in another form. For in each we have to reproduce motor symbols of the words. Written or printed symbols are 'symbols of symbols.'" The patient who cannot write can usually copy and can often sign his own name when .e cannot write anything else.

[1] Throughout the whole of Dr. Jackson's subsequent papers the term "speechless patient" refers definitely to this class of aphasic. This definition of his use of "speechless" occurs again in the first paper he wrote for BRAIN [p. 116].

Moreover he may find no difficulty in copying exactly the contents of a printed document in fluent handwriting although he is quite unable to write any of these words spontaneously or to dictation.

(*c*) Do they know what is said to them? In Class I, where the patient is speechless except for some recurrent utterance or jargon, they usually do understand; but in Class II, where they have free but disorderly utterance, they often do not quickly understand words said to them.

(*d*) Can they repeat words said to them? In Class I they cannot, whilst in Class II they can with or without blunders.

(*e*) They cannot read but they often can understand what is read to them.

He then passes on to show that the general law underlying these disturbances of speech is that voluntary power is diminished with retention of the power to carry out the same movement in a more automatic manner. This is illustrated by the example of the speechless man who was unable to protrude his tongue when told to do so, although he could perform this movement perfectly to lick a crumb from his lips.

These "speechless" patients are not "wordless," for they can swear and even ejaculate appropriately on occasion; a man usually speechless may even at times get out an actual proposition. But the words of a "speechless" patient are not at his disposal for voluntary use; they exist for comprehension and can also be called upon under emotional stress but, like the movement of the tongue, they cannot be reached by the will.

This aspect of the phenomena in speechless patients had been elaborated by Jackson in a previous paper [p. 48].

"In some cases of defect of speech," he says, "the patient seems to have lost much of his power to do anything he is told to do even when those muscles are not paralysed. Thus a patient will be unable to put out his tongue when we ask him, although he will use it well in semi-involuntary actions, e.g., eating and swallowing. He will not make the particular grimace he is told to do even when we make one for him to imitate. There is power in his muscles and in the centres for the co-ordination of muscular groups but he, the whole man or the 'will,' cannot set them a-going. Such a patient may do a thing well at one time but not at another. In a few cases the patients do not do things so simple as moving the hand (i.e. the non-paralysed hand) when they are told.

"Although [p. 49 *et seq.*] the difference in the execution of voluntary

and involuntary movements is very striking in some cases of loss of speech, the degree of loss of power to utter words must not be taken as a certain index of this difference. . . . Anyone who has tried to use the ophthalmoscope in many cases where speech is lost or defective, will find how great the difference is in different cases. . . . A few months ago a patient came under my care who could only say 'pooh! pooh!' and an examination of his eyes was almost impracticable. He made efforts, but he never did what I told him, whether it was to look in a particular way or to keep his eyes still. Instead of opening them, he opened his mouth or screwed up his face, or shut his eye and could not be got to look in any particular direction, although he seemed to be on the alert to act and was all the time doing something with his muscles. . . . Now it may be said that patients do not know what we wish them to do. But (one) patient when told to look at my finger seemed to know what was wanted, for when I was about to give up in despair he took hold of my little finger, as I guessed deprecatingly, and as much as to say he knew what was wanted but could not do it. . . . It will be observed that a speechless patient who cannot put out his tongue when told will sometimes actually put his fingers into his mouth as if to help to get it out; and yet not infrequently when we are tired of urging him he will lick his lips with it. Now, as a rule, the worst of these patients can generally smile, and all such involuntary processes go on well enough. I say generally, for a physician who has seen many cases of defective speech will be obliged to use the word 'generally.'"

Here we have a clear recognition of the variability of response in all such cases of affection of speech. This variability and uncertainty of obtaining the same result throughout a series of observations is one of the characteristics of defective cortical activity and is responsible for much of the difficulty in recording results of a clinical examination in cases of aphasia.

Not only do the results of any series of similar observations vary enormously, so that at one moment the patient seems to possess a faculty of which he is devoid at the next, but all use of such words as "agraphia," "alexia," "amnesia verbalis," and the like is rendered impossible and highly dangerous to the truth of the record by the selective nature of the loss in any one group of tests.

How, for instance, are we to characterize in one word the condition of the man who can write his name, that of his house, the number and the street, the county and kingdom correctly, and yet cannot do the

same for his mother with whom he lives? Is he suffering from agraphia or not? What name is to be applied to the state of a man who cannot read a word of a letter he has received when asked to do so, but who carries out the instructions it contains accurately with regard to time and place? Is he a case of alexia or not? In a similar way the use of the phrase amnesia verbalis lands us in numerous difficulties. Supposing that after the patient has failed to name several common objects he says, when shown the ink—"That's what I should call a china pot to hold ink"—has he amnesia or not? On Jackson's view the significance of such an answer is clear: the disturbance of voluntary speech destroys the power of making the more selective answer "ink" but permits a more descriptive response. What, again, is the condition of a man who cannot draw a "square" when asked to do so, but asked to draw a "block of wood" at once draws a perfect square?

Chapter IV.—Superior and Inferior Speech.

The idea that speech is a mental process which can be split by disease into emotional and intellectual expression was developed by Jackson into the differentiation of superior and inferior speech.

"Figuratively speaking, emotion uses propositions in a largely interjectional manner, that is to say reduces them to or towards inferior speech. Emotion, as it were, appropriates and subordinates an intellectual utterance" [p. 163].

The words uttered by an otherwise speechless patient can be divided into "recurring utterances" and "occasional utterances."

Recurring utterances may be:—

(1) Jargon such as "Yabby" "Me, me committimy, pittymy, loss, deah." They have no propositional value whatever.

(2) Sometimes the utterance is a word such as "man" "awful"—this is not a word to the patient; for although a single word may have a propositional value to a healthy person these words have none for the patient. The speechless man's "one" comes out at any time and not appropriately as when a normal person is asked "How many oranges will you have?" and answers "One."

(3) The recurrent utterance may be a phrase such as "Come on," "Oh, my God!" These phrases, which have a propositional structure, have in the mouths of speechless patients no propositional value. They are at best interjectional.

(4) It is common for the patient to retain as his sole utterance

"yes" or "no," or both these words. To speak is to propositionize, and "yes" and "no" are "proposition-words." But they are not always used for assent and dissent, and in so far they are not propositions and are therefore liable to be retained by the speechless patient. He may utter "yes" and "no" without any sort of application, or even the one when he means the other. But although the actual word used may be incorrect, the tone in which it is uttered and the smile or gesture which accompanies it, may correctly express the patient's meaning.

In some cases, however, of loss of speech, there may be a use of "yes" and "no" higher than a mere emotional service; the patient can reply with them. But even in such cases they may not reach the level of normal speech. The patient cannot utter the word in all the ways healthy people can. He may be able to reply "no" to a question requiring dissent, although he cannot say the word when he is told and when he tries to do so.

Occasionally he can not only use "yes" and "no" correctly, but can even repeat them. Here, then, we have propositional speech and voluntary utterance although otherwise these powers have been destroyed.

Hughlings Jackson then deals with the occasional utterances which may occur in the speech of the aphasic patient. These may be:—

(1) Utterances which are not speech, such as swearing and ejaculation. The patient may say "Oh, dear," or "Bless my life," but cannot repeat them voluntarily. In some people oaths have become very deeply automatic, almost as much so as smiles and frowns; they are, so to speak, "detonating commas."

(2) Occasional utterances may be true, though inferior, speech. A speechless patient said, "Whoa, whoa," when standing by his horse, another could say "Goodbye" when a friend was leaving the room, and yet neither patient could repeat the word he had used appropriately when asked to do so.

(3) He records still higher degrees of utterance by speechless patients—a woman suddenly asked "How is Alice getting on?" A man who was asked where his tools were, answered "Master's." Both of these were of high propositional value, especially the latter; in neither case, however, could they be repeated or recalled voluntarily. They rose to expression under the influence of great emotional stress.

Passing on to a higher level of utterance, he points out that many patients who can say a word such as "Battersea" cannot say either "batter" or "sea." The whole word rises in speech on account of its

appropriateness, whilst the two halves are in reality two fresh words in no way required by the circumstances.

Perseveration or "barrel-organism" he refers to automatic repetition analogous to the automatic acts which occur in other states when the activity of the higher levels of consciousness is reduced, and quotes a case of Dr. Buzzard's of high-grade automatic acts following fracture of the base of the skull.

Chapter V.—Speaking and Thinking.

It is precisely in his handling of the problems of speaking and thinking that Jackson lies furthest from the ideas of the neurologist and anticipates in a remarkable manner the present views of students of language. "Of course," he says [p. 56], "we do not either speak or think in words or signs only, but in words or signs referring to one another in a particular manner. . . . Indeed, words in sentences lose their individual meaning, if single words can be strictly said to have any meaning, and the whole sentence becomes a unit, not a word heap." We must not forget that in 1866, when this view was put forward, scientists were dominated by the idea that we "think in words." No one had considered that words might disappear in the unity of a sentence, still less that behind the sentence might lie a general verbal proposition.

Jackson saw that disease might separate these processes, which lie on the way from thinking to speaking, and that the phenomena of aphasia were analytical examples of the mechanism of normal speech. Moreover, he lays stress on the importance of recognizing that there is no such thing as the "faculty" of language and "the use of the word 'memory' in the sense of its being a distinct faculty is likely to lead to confusion." There is no faculty of memory apart from the things remembered. It is necessary to bear these points clearly in mind if we wish to comprehend his attitude towards affections of speech. Their interest for him lay in their value as illustrations of general neurological laws and of the mechanism of normal speech.

§ 1.—*To Speak is to Propositionize.*

"It is not enough to say that speech consists of words. It consists of words referring to one another in a particular manner; and without a proper interrelation of its parts a verbal utterance would be a mere succession of names embodying no proposition. A proposition—e.g.,

gold is yellow—consists of two names, each of which, by conventional contrivances of position, &c. . . . modifies the meaning of the other. All the names in a random succession of words may, it is true, one after the other, excite perception in us, but not perceptions in any relation to one another deserving of the name of thought. The several perceptions so revived do not make a unit. We are told nothing by a mere sequence of names, although our organization is stirred by each of them. Now a proposition is not—that is to say, in its effect on us—a *mere* sequence.

"When we apprehend a proposition, a relation between two things is given us—is for the moment, indeed, forced upon us by the conventional tricks which put the two names in the respective relations of subject and predicate. We receive in a twofold manner, not the words only, but the order of the words also" [p. 66].

"Single words are meaningless, and so is any unrelated succession of words. The unit of speech is a proposition. A single word is, or is in effect, a proposition, if other words in relation are implied. . . . It is from the use of a word that we gather its propositional value. The words 'yes' and 'no' are propositions, but only when used for assent and dissent; they are used by healthy people interjectionally as well as propositionally. A speechless patient may retain the word 'no,' and yet have only the interjectional or emotional, not the propositional use of it; he utters it in various tones as signs of feeling only. He may have a propositional use of it, but yet a use of it short of that healthy people have, being able to reply "no" but not to say "no" when told. . . . On the other hand, elaborate oaths, in spite of their propositional structure, are not propositions, for they have not, either in the mind of the utterer or in that of the person to whom they are uttered, any meaning at all; they may be called 'dead propositions.' . . ."

"Loss of speech is, therefore, the loss of power to propositionize. It is not only loss of power to propositionize aloud (to talk), but to propositionize either internally or externally, and it may exist when the patient remains able to utter some few words. We do not mean by using the popular word 'power,' that the speechless man has lost any 'faculty' of speech or propositionizing; he has lost those words which serve in speech, the nervous arrangements for them being destroyed. There is no 'faculty' or 'power' of speech apart from words revived or revivable in propositions, any more than there is a 'faculty' of co-ordination of movements apart from movements represented in

particular ways. We must here say, too, that besides the use of words in speech there is a service of words which is not speech; hence we do not use the expression that the speechless man has lost words, but that he has lost those words which serve in speech. In brief, speechlessness does not mean entire wordlessness."

"On the psychical side (we) must look on the condition as one of loss of words used in speech. The expression 'loss of memory for words' is too indefinite. . . . We must, indeed, bear vividly in mind that the patient has words remaining; it will not do to think of this positive condition under the vague expression that 'he retains a memory of words.' If we do use such redundant expressions, we must be thorough in our application of them, and say two things: (1) that the speechless patient has lost the memory of the words serving in speech; and (2) that he has not lost the memory of words serving in other ways. In healthy people every word is in duplicate. The experiment which disease brutally makes on man seems to me to demonstrate this; it takes one set of words away and leaves the other set" [p. 113 *et seq.*].

The words removed are those employed in the formation of propositions; those which remain to the speechless patient are the same words used non-propositionally or in the lowliest form of proposition. Less extensive damage of speech disorders the use of words in such a way that, the higher or more abstract the proposition, the more likely is the patient to fail, not only in the emission of a correct verbal equivalent, but in the recognition within himself of the full value of the proposition.

§ 2.—*Internal and External Speech.*

One of the greatest obstacles to mutual understanding amongst students of speech has been the diverse use of the expression "internal speech." "Internal speech," "langage intérieur" and "innere Sprache" have not even been used consistently in any one language. But if we combine all the various uses to which these expressions have been put by different writers we shall find that they have been made to comprehend at least three different processes. They have been used for unspoken speech, as for instance when we move our lips but utter no sound whilst writing; they have been used for the formulation in words which precedes utterance, and even for those general processes of thought which result in propositions spoken or unspoken.

Fortunately Jackson leaves no doubt in which sense he uses the expression "internal speech" and throughout his writing he remains steadfast to the original definition.

After demonstrating that speech is not simply the utterance of words but is essentially the formation of propositions, he points out that there is no difference in this respect between external and internal speech.

"I do not mean," he says [p. 182], "that propositioning occurs only when we speak to tell others what we think, but that it occurs when, so to say, we are telling ourselves what we think. Whether 'gold is yellow' is said aloud or whether it is thought that gold is yellow, there is propositioning, a relation of images to one another in a particular way."

Jackson thought of internal speech as identical in form and nature with uttered speech except that it was not passed over the vocal organs. He therefore sought for some means of investigating disturbances of internal speech, and believed that writing was invariably defective whenever internal speech was disturbed; writing is the key to the conditions of internal speech.

The speechless patient not only cannot speak aloud, he cannot propositionize internally. This is shown by the fact that he cannot write. He may copy accurately, and can copy print in written characters, but cannot express himself in writing. He can say nothing to himself, and therefore has nothing to write. For its character as speech, it matters nothing whether the proposition be said to oneself or spoken aloud.

"So, then, the speechless patient has lost speech, not only in the popular sense that he cannot speak aloud, but in the fullest sense; he cannot propositionize in any fashion. If this be really so, we must not say that speech is external thought, for there is no essential difference betwixt internal and external speech. We speak not only to tell other people what we think, but to tell ourselves what we think. Speech is a part of thought, a part in which we may or may not exteriorize. Again it is not well to say that thought is internal speech, for the man who is speechless (the man who has no internal speech) can think. How well or ill he can think we will discuss later. . . . There are two ways in which words serve in thought; speech is but one way, and this, whether it be internal or external, is, physiologically, a function of the left cerebral hemisphere.

"Those who do not limit the definition of speech as we have done,

would suppose that if a man had lost speech altogether (internal as well as external) there could be nothing further to say about words in his case; for it is sometimes assumed that words serve only in speech. But the cases of persons who have lost speech show that speechlessness does not imply wordlessness; for if I say to a man who cannot speak at all, 'gold is yellow' (or anything not difficult or novel to him) he readily understands it" [p. 82 *et seq.*].

"Internal speech and internal reproduction of words are not therefore synonymous. There is a voluntary internal reproduction of words in new and propositional forms which occurs when we write, and there is an automatic internal reproduction of words in old and acquired forms or in forms given us when we receive and understand words in propositions spoken to us" [p. 78].

Thus the speechless man can think because he has in automatic forms all the words he ever had; he will be lame in his thinking because not being able to revive words he will not be able to register new and complex experiences of things.

"To receive a proposition and to form one are plainly two different things. It is true that in each case our own nervous centres for words are concerned; but when we receive a proposition the process is entirely automatic, and unless we are deaf, or what is for the time equivalent, absorbed, we cannot help receiving it. When anyone says to me 'gold is yellow,' I am, so to speak, his victim, and the words he utters rouse similar ones in me; there is no effort on my part, the revival occurs in spite of me if my ears are healthy. Moreover the speaker makes me a double gift; he not only revives words in my brain, but he revives them in a particular order—he revives a proposition. But if I have to say 'Gold is yellow,' I have to revive the words, and I have to put them in propositional order. The speechless man can receive propositions, but he cannot form them, cannot speak" [p. 84].

"Internal and external speech differ in degree only; such a difference is insignificant in comparison with that betwixt the prior unconscious or subconscious and automatic reproduction of words and the sequent-conscious and voluntary reproduction of words; the latter alone is speech either external or internal" [p. 124].

Thus both external and internal speech are processes which do not differ from one another in principle; they differ solely in that the one leads to articulatory verbalization, the other to no utterance except perhaps in writing.

But behind these varieties of formulated speech lie more "subjective," more automatic processes which precede the revival of words. In the next section we shall try to set out Jackson's views of the nature of these processes and the extent to which they are disturbed in the speech of the aphasic.

§ 3. *The "Proposition" antecedent to Internal and External Speech.*

So far Jackson's nomenclature can lead to no serious misunderstanding. Internal and external speech or their equivalents in other languages have been used with such diverse meanings by various authorities that his clear definition of the use to which he puts these terms cannot lead to confusion. But when he deals with the processes behind internal speech his use of the words "subject" and "object" is liable to lead the reader to reject his views incontinently. If, however, an attempt is made to discover the principles underlying such phrases as "subject and object proposition," the observer will find an idea which enables him to understand the phenomenon of aphasia and to invent tests which bring out the limits and nature of the loss of speech in any particular case.

"In all voluntary operations," he says, "there is preconception. The operation is nascently done before it is actually done; there is a 'dream' of an operation as formerly doing before the operation; there is dual action. Before I put out my arm voluntarily I must have a 'dream' of the hand as already put out. So, too, before I can *think* of now putting it out I must have a like 'dream,' for the difference betwixt thinking of now doing and actually doing, is, like the difference between internal and external speech, only one of degree" [p. 168].

Jackson saw clearly that the process of forming a proposition to be expressed by internal or external speech was a double one. First the mind must be aroused in propositional form and then the words must be fitted to the proposition. This fitting of words to the proposition is internal or external speech, according as it finds utterance to oneself or to the outside world; the process which precedes this is what he called the "subject-proposition."

"If we coin the term *verbalizing* to include the whole process of which speech is only the end or second half, we may say that there are in it two propositions; the subject-proposition followed by the object-

proposition. . . . The subject-proposition symbolizes the internal relation of two images, internal in the sense that each of them is related to all other images already organized in us and thus it symbolizes states of *us*. The object-proposition symbolizes relation of these two images as for things in the environment, each of which images is related to all other images then organizing from the environment; thus it stands for states of the environment. The two propositions together symbolize an internal relation of images in relation to an external relation of images" [p. 151].

At first sight this attempt to divide the formation of a proposition into two stages may appear fanciful hair-splitting. But not only is its truth obvious, but the necessity of some such discrimination will appear to anyone familiar with two languages. A proposition may be built up in the mind and be registered in memory to be uttered indifferently in either language. Whichever language is ultimately the vehicle for its emission there is no feeling of translation, no bias against the proposition making its appearance in one rather than in the other language. Once uttered, however, in one particular language its use in the other is accompanied by a feeling of translation, a bias which not infrequently destroys its freedom of use.

Not only does introspection show the necessity of some such hypothesis, but the phenomena of aphasia cannot be understood without it. For although the process standing directly behind internal and external speech is distinctly affected in the majority of cases of aphasia it may be less affected than internal and external speech, because it is not so definitely verbalized. It is more automatic and aroused by the incoming stream of impressions. Moreover it serves more closely in the processes of thought than internal and external speech.

"For the perception (or recognition or thinking) of things," he says [p. 123], "at least in simple relations speech is not necessary, for such thought remains to the speechless man. Words are required for thinking, for most of our thinking at least, but the speechless man is not wordless; there is an automatic and unconscious or subconscious service of words."

"It is not, of course, said that speech is not required for thinking on novel and complex subjects, for ordering images in new and complex relations, and thus the process of perception in the speechless, but not wordless, man may be defective in the sense of being inferior from lack of co-operation of speech: it is not itself in fault, it is left unaided."

In many persons the processes of thought are accompanied in part

at any rate by internal, and in some, especially the less educated, by external speech. But internal and external speech are not necessary to perfect logical thought, whilst the process called by Jackson "subject-proposition" forms an essential portion of the act of thinking.

Behind this "subject-proposition" stands that mental process included by Jackson under the name of "image" or "symbol" and this forms the subject of the next section of the chapter devoted to his views on speaking and thinking.

§ 4.—*"Imperception" and the Condition of the "Images" in a Speechless Patient.*

No aspect of this work exhibits Jackson's peculiar insight more clearly than his treatment of the mental processes which stand behind the birth of a propositional statement. For at a time when everyone assumed that the destruction of auditory and visual word images was a sufficient explanation of the phenomena of aphasia, he saw that in the speechless man these images might be intact.

He divided cases of speech defect of central origin into two groups, those where images were intact and those in which they were defective.[1] To the latter he gave the name "imperception" and pointed out that this state corresponded on the afferent side to aphasia in the word series. Many years before the invention of the term "agnosia" Jackson clearly described this condition under the term "imperception" and illustrated his description with clinical instances.

In many cases met with in practice, aphasia and imperception are combined; but the great merit of Jackson's observations is the clearness with which he saw the necessity of separating these two factors in any particular example. At that time everyone believed that the destruction of "images" was a simple explanation of aphasia. Jackson showed that there were affections of speech in which "images" might be defective, but, on the other hand, they were certainly not abolished in a large number of cases of aphasia.

"We must then briefly consider," he says [p. 121 *et seq.*], "the patient's condition in regard to the images symbolized by words. For although we artificially separate speech and perception, words and images co-operate intimately in most mentation. Moreover, there is a

[1] Cases of so-called "Mind-Blindness," where this power is lost, are due to extensive "imperception" and in so far do not come into this discussion.

morbid condition in the image series (imperception), which corresponds to aphasia in the word series. The two should be studied in relation.

"The speechless patient's perception . . . (propositions of images) is unaffected, at any rate as regards simple matters. To give examples: he will point to any object he knew before his illness which we name; he recognizes drawings of all objects which he knew before his illness. He continues able to play cards or dominoes; he recognizes handwriting, although he cannot read the words written; he knows poetry from prose, by the different endings of the lines on the right side of the page. One of my patients found out the continuation of a series of papers in a magazine volume and had the right page ready for her husband when he returned from his work; yet she, since her illness, could not read a word herself, nor point to a letter, nor could she point to a figure on the clock. There is better and simpler evidence than that just adduced that the image series is unaffected; the foregoing is intended to show that the inability to read is not due to loss of perception nor to non-recognition of letters, as particular marks or drawings, but to loss of speech. Written or printed words cease to be symbols of words used in speech for the simple reason that those words no longer exist to be symbolized; the written or printed words are left as symbols of nothing, as mere drawings. The simplest example showing the image series to be undamaged is that the patient finds his way about; this requires preconception, that is 'propositions of images' of streets, &c. Moreover the patient can, if he retains the propositional use of 'yes' and 'no,' or if he has the equivalent pantomimic symbols, intelligently assent or dissent to simple statements as that 'racehorses are the swiftest horses' showing that he retains organized nervous arrangements for the images of the things 'swiftness' and 'horse'; this has already been implied when it was asserted that he understands what we say to him, a process requiring not some of his words only, but also some of his 'images' of things of which the words are but symbols . . . .'

"These facts as to the retention of images are important as regards the writing of speechless patients. The printed or written letters and words are images, but they differ from the images of objects, being artificial and arbitrary, in being acquired later; they are acquired after speech and have their meaning only through speech; written words are symbols of symbols of images. The aphasic patient cannot express himself in writing because he cannot speak; but the nervous arrangements for those arbitrary images which are named letters are intact, and thus he can reproduce them as mere drawings, as he can other

images, although with more difficulty, they, besides lacking their accustomed stimulus, being less organized. He can copy writing and can copy print into writing. When he copies print into writing, obviously he derives the images of letters from his own mind. He does not write in the sense of expressing himself, because there are no words reproduced in speech to express. That series of artificial images which make up the signature of one's own name has become almost as fully organized as many ordinary images; hence in many cases the speechless man who can write nothing else without copy can sign his own name" [p. 123].

Jackson recognized that in the speechless person we possessed a means of analysis of the processes behind the formation of speech. Images, whether direct or symbolic, together with those unconscious mental processes on which they may depend, remain intact in the speechless patient. He cannot speak, he cannot write, he cannot read, not because he has lost "images" or "memories" of words, but because he cannot propositionize. He has lost the use of words in speech.

Those cases where images are affected suffer from a distinct and definite defect which he calls "imperception." Speechlessness may exist without imperception, and it is from such cases only that we can obtain a clear analysis of the processes which make up speech.

§ 5.—*The Mind of the Aphasic.*

Jackson's method of treating the phenomena of loss of speech entirely from the psychical aspect, robs the question as to the condition of intelligence in the aphasic patient of half its significance. In his Norwich address he laid down that the question was not "How is general mind damaged?" but "What aspect of mind is damaged?" He then proceeded to indicate one by one the changes we have considered in previous sections of this chapter.

But when a man has lost the power of propositionizing and cannot speak or write, when both internal and external speech have been destroyed and the process which stands between them and his perceptions is also disturbed, it is obvious, as Jackson points out, that he will be "lame in thinking." The reception of complex and novel propositions demands internal speech for that formulation which must precede their committal to memory. Thus the existence of "inferior speech" is associated with distinctly "inferior comprehension."

Suppose, however, "imperception" is added to the defect of speech, the formation of images, arbitrary symbols and those unconscious processes which precede their development will be disturbed. The "general intelligence" will then appear to suffer greatly; for the mind will be struck, not only on its emissory, but also on its receptive side.

Thus Jackson saw that the question was not one of loss of "general intelligence," but the disturbance of certain activities of the mind associated with those lesions of the brain which could affect speech.

Chapter VI.—Speech and Cerebral Localization.

It is not to be wondered at that a man who held these views on aphasia and analysed the phenomena exhibited by the speechless patient in this manner remained incomprehensible to his contemporaries and even to the younger generation. The air was thick with schematic representations of centres of all kinds; there were "auditory," "visual," and "motor-word centres," "centres" for writing and naming, and even for ideation.

"It is well to insist again," he says [p. 114], "that speech and words are psychical terms; words have of course anatomical substrata or bases as all other psychical states have. We must as carefully distinguish betwixt words and their physical bases, as we do betwixt colour and its physical basis: a psychical state is always accompanied by a physical state, but, nevertheless, the two things have distinct natures. Hence we must not say that the 'memory of words' is a function of any part of the nervous system, for function is a physiological term."

"A method which is founded on classifications which are partly anatomical and physiological, and partly psychological, confuses the real issues. These mixed classifications lead to the use of such expressions as that an idea of a word produces articulatory movement; whereas a psychical state, an 'idea of a word' (or simply 'a word') cannot produce an articulatory movement, a physical state" [p. 108].

"The anatomical substratum of a word is a nervous process of a highly special movement of the articulatory series. That we may have an 'idea' of a word it suffices that the nervous process for it energizes; it is not necessary that it energizes so strongly that currents reach the articulatory muscles. How it is that from any degree of energizing of any kind or arrangement of any sort of matter we have 'ideas' is not a point we are here concerned with" [p. 85].

"The notion that movements or cerebral nervous arrangements for

them serve in mentation is grotesque. The statement is that a word, a psychical thing, is concomitant with discharges of certain cerebral arrangements representing one or more articulatory movements—and that words serve in mentation" [p. 177].

From his first paper in 1864, throughout the whole series he emphasizes the psychical nature of the phenomena of loss of speech. These changes in mental activity are associated with material destruction of the cerebrum, but it is fallacious to attempt to localize the various activities into which speech may be analysed by introspection, or by disease, in various portions of the cortex.

"Whilst I believe," he says [p. 81] "that the hinder part of the left third frontal convolution is the part most often damaged I do not localize speech in any such small part of the brain. To locate the damage which destroys speech and to localize speech are two different things. The damage is in my experience always in the region of the corpus striatum."

He also pointed out that the nearer the disease lay to the corpus striatum the more likely is defect of articulation to be the striking feature of the case: whilst the farther off the disease lies from this part, the more likely will the main characteristic be mistakes in words.

In his Norwich address in 1868, he pointed out that affections of speech of cerebral origin could be divided into two classes: Class I, in which the patient is speechless, or nearly so, or in which speech is very much damaged; Class II, in which there are plentiful words but mistakes in words. In the first class the disease tends to lie in the neighbourhood of the corpus striatum, whilst in the second class it reaches farther back or deeper in the brain.

Even in 1866 he indicated the fundamental error in Broca's localization of the "faculty of speech" and the "memory of words." In an extract from the *Bulletins de la Société Anatomique* for July, 1863, Broca says, "Pour expliquer comment un aphémique comprend de langage parlé sans pouvoir cependant répéter les mots qu'il vient d'entendre, on pourrait dire qu'il a perdu, non la mémoire des mots, mais la mémoire des moyens de co-ordination que l'on emploie pour articuler les mots." Jackson takes up this definition [p. 51] and points out that the use of the word memory in the sense of its being a distinct faculty is likely to lead to confusion. The speechless man understands because words remain to him in as far as they are excited from without; he cannot speak because he has lost the service of words in propositions. The words he retains in non-propositional forms may be perfectly

articulated. To say that he has lost "la mémoire des moyens de co-ordination que l'on emploie pour articuler les mots" when he can still articulate some words, is most misleading. Moreover, Broca entirely missed the significance of the fact that the speechless man cannot write.

Jackson believed that the automatic service of words was associated with activity of the right hemisphere. In right-handed people the left hemisphere was the leading one and subserved the use of words in propositional forms; it also had its lower use in the automatic service of words. The lower, more automatic activities were centred in both hemispheres; but the left alone possessed the power, sequent to its neural action, of exciting words in propositional forms.

"I think the facts of cases of loss of speech from damage to but one—the left—half, show conclusively that as regards the use of words the brain *is* double in function. But the very same cases show that the two hemispheres are not mere duplicates in this function. Both halves are alike in so far as each contains processes for words. They are unlike in that the left alone is for the use of words in speech" [p. 81].

Chapter VII.—Summary.

In spite of its occasional obscurity, Dr. Jackson's work is of peculiar importance to the neurologist of to-day, both as a practical guide to an understanding of the clinical phenomena of aphasia and, theoretically, because of his conception of the processes which underlie the production of speech. I have attempted to present his views as a coherent whole, and for every statement to be found in my account of his work a reference has been given to one or more of his papers. But in consequence of the fortuitous manner in which many of his views were presented there is much repetition, and some of his most valuable conceptions appear amongst a good deal that is no longer of importance to us.

It will be well, therefore, to sum up the points in which Jackson's observations and views can help us to-day. In this summary I shall begin with those points of more practical importance in revealing the clinical phenomena of aphasia, and shall end with those of more theoretical significance.

(1) In 1868 [p. 60] Hughlings Jackson pointed out that patients with aphasia could be divided into two main groups. In Class 1 the patient was almost speechless, or, at any rate, speech was gravely damaged; but in the worst of these cases he can utter some one or two unvarying

words or jargon. Class 2 comprises those who have "plentiful words," but habitually use them wrongly.

(2) The loss of power to carry out an order depends on the complexity of the task. The more abstract the conception the more likely is the patient to fail in executing it, although he may succeed when it is put before him in a simpler and more descriptive form. Thus the patient who could not find the word "kitten" called it a "little fur-child," and one who could not draw a square when asked to do so drew a perfect square when told to draw a "block of wood." Thus it is most important when asking an aphasic patient to carry out some order, to present it to him if possible in several forms, noting accurately his response in each case; because a man cannot write the alphabet we must not assume he cannot write a letter.

(3) The higher and voluntary aspects of speech tend to suffer more than the lower or more automatic. The least voluntary speech is that which is emitted under the effect of emotion, such as exclamations, oaths, and words, such as "good-bye," rising to utterance under the impulse of a moment. In many cases "yes" and "no" can be used appropriately as propositions, and even words or phrases of true propositional value may spring to the lips of the aphasic patient. But in such cases he is usually unable to repeat at will the phrase he has just used under an appropriate impulse. The "speechless man is not wordless," and the apparent inconsequence of observations on persons with aphasia is to a great extent removed by an analysis of the conceptual value of the words and phrases which are actually uttered.

(4) Writing is affected, not as a separate "faculty," but as a part of the failure to propositionize in words. There is no such condition as pure "agraphia." A man who cannot write spontaneously may be able to copy printed matter in perfect handwriting. The "faculty" of relating handwriting to print is intact; he cannot write voluntarily because he has lost the use of written words in propositions. Hence he can usually write his name and address, because in most of us this has reached with time more nearly the level of an automatic act.

(5) Patients with such affections of speech may not be able to read aloud or to themselves when asked to do so; but they can understand what is read to them and may even obey written commands although unable to reproduce them in words. This is not due to some loss of function called "alexia," but to an inability to reproduce a proposition which, on the other hand, they may be capable of receiving accurately.

(6) "Imperception" (agnosia) is on the receptive side what aphasia

is in the "word series." In many cases the two conditions are combined; but they may exist separately, and where aphasia is present without "Imperception," images remain intact. Thus the patient may be able to point to colours and objects when they are named; he continues able to play cards or dominoes, he recognizes handwriting, although he cannot read the words written; he knows poetry from prose by the different endings of the lines on the right of the page.

Thus affections of speech are caused (*a*) on the emissive side by inability to form or to express a proposition in words, (*b*) on the receptive side by failure of those mental processes which underlie perceptual recognition.

(7) External and internal speech are identical, except that the one leads to the utterance of articulated words, whilst the condition of internal speech can be discovered by writing only.

(8) Behind external and internal speech stands the proposition which, when verbalized, can be expressed in speech or writing.

This proposition is necessary for clear and logical thought, but not for all thinking. When this aspect of speech is affected the patient cannot retain a sequence of abstract propositions because he is unable to formulate them at will to himself. He can think, but he is "lame in thinking."

(9) If, however, "Imperception" (agnosia) is added to such defect of speech the patient will not only suffer from "Inferior Speech" but will show signs of "Inferior Comprehension."

(10) In the majority of cases of affections of speech mental images are unaffected. This extremely important contribution to the theory of aphasia has been entirely neglected by neurologists. For almost every hypothesis propounded in the last forty years presupposes some defect in "auditory" or "visual word images."

REPRINT OF SOME OF DR. HUGHLINGS JACKSON'S PAPERS ON AFFECTIONS OF SPEECH.

For permission to reprint these papers we are indebted to the kindness of the Editor of the "British Medical Journal," the Editor of "The Lancet," the Editor of "The Medical Press and Circular," and Messrs. Churchill, the proprietors of the now extinct "Medical Times and Gazette."

LOSS OF SPEECH: ITS ASSOCIATION WITH VALVULAR DISEASE OF THE HEART AND WITH HEMIPLEGIA ON THE RIGHT SIDE.—DEFECTS OF SMELL.—DEFECTS OF SPEECH IN CHOREA.—ARTERIAL LESIONS IN EPILEPSY.

[*Clinical Lectures and Reports, London Hospital*, 1864, vol i, p. 388.]

I BRING forward, in this paper, thirty-four cases of hemiplegia, in all of which loss of speech, in a greater or less degree, was present. In thirty-one the hemiplegia was on the right side; in three on the left. In two additional cases there was no hemiplegia at all.

The chief physiological results of the following observations I arrived at independently, but on every point of importance I have been anticipated by M. Broca. Therefore, what I have to do is simply to bring forward my work as evidence bearing on his views. Besides, M. Broca has studied the subject from another point of view, and has arrived at more precise results than I can possibly deduce from observations which are clinical only. M. Broca believes that disease of the left side of the brain only, produces loss of language; and moreover, he locates the faculty of articulate language in a very limited part of that hemisphere. My observations tend to support the first hypothesis, and, in a general way, the second. The convolution of articulate language of Broca is but one of many convolutions supplied by the left middle cerebral artery, which vessel I believe to have been plugged in most of the following cases of "Loss of Speech with Hemiplegia on the Right Side." Therefore, my observations must necessarily be indefinite evidence as to the exact seat of the faculty of language, or of articulate language, but fairly definite as to the side of the brain in which these faculties reside.

Then, as to the clinical part of the paper. Plugging of the cerebral arteries is now an old and established subject, and for the relation of embolism to valvular disease we are indebted to the researches of Dr. Kirkes. Here, again, I have no novelty of any importance to bring forward, but I think the concurrence of hemiplegia with loss of speech and valvular disease of the heart has not been specially noticed. Yet I wish to draw attention to the fact that in Dr. Kirkes's first paper (the first cases of hemiplegia from embolism of the middle cerebral arteries ever recorded) it is mentioned that there was loss of speech with the hemiplegia.

Again, the various kinds of defects included in this paper under "Loss or Defect of Speech," and which will be discussed farther on, have long been described; as, for instance, in M. Broca's work, "Sur le Siège de la Faculté du Langage articulé." But I am indebted to Dr. Brown-Séquard, my late colleague at the Hospital for Epilepsy and Paralysis, for first teaching me to distinguish from one another in actual cases—defects of language, speech, articulation, &c.

I have premised the above as to priority, simply to have done with it, and in order that I may give with more freedom, and in my own way, the steps by which I arrived at the results announced in this paper. I remark then, once for all, that although I have in a great part of my subject worked quite independently, I lay no claim to priority on any point of importance.

I wish also to draw attention prominently to the fact that my personal experience of these cases is clinical only. Most of them are chronic ones, and I have not had a single *post-mortem* on a patient who has died under my care with loss of speech and hemiplegia. I must, then, of necessity, keep almost entirely to the clinical aspect, and say little or nothing about the exact convolution of the brain, damage of which produces loss or defect of speech. In the quotation from M. Broca's paper, more definite information will be found on this subject. He gives the result of twenty autopsies. It is obvious that in the physiological study of the convolutions of the brain, an autopsy is the only trustworthy means of getting precise information. Yet it is equally obvious that a great deal of clinical work must be done beforehand if our pathological facts are to have any precise value as physiological evidence.

Besides its physiological value and clinical importance, the subject has great psychological interest. Its medico-legal bearings, also, are highly important. But here, again, I am anxious to wander as little

as possible from the clinical study of the cases. My object now is briefly this, to try to show under what circumstances, and in association with what other symptoms, loss or defect of speech occurs, rather than to discuss the mental bearings of the symptom itself. To do the latter would require a vast amount of time and space, and would, besides, draw me into a subject to which, I confess, I have not yet paid the attention it deserves. I am glad to be able to say that M. Broca is now preparing a work which will include all that he has done in the matter. This renders it still less necessary for me to do more now than define the terms I must use for my present purpose—to circumscribe the symptom rather than to show its psychological relationship to other definite mental faculties or to mind generally. In what follows, then, little more will be attempted than to distinguish the mental symptoms of the cases, which I include under the word "speech," from other defects in talking which bear a superficial resemblance to them, and with which they might easily be confounded. I wish, in short, to speak of the cases as they appear to medical practitioners.

In the first place, let me say, once for all, that I do not mean mere difficulty in utterance from more or less paralysis of the lips,[1] tongue and palate, but a mental defect, more or less loss of language, varying from the most general to the most special manifestation of that faculty. Under the word "speech," then, I include all grades and varieties of expression of ideas, chiefly by words as distinguished from the mere utterance of words by the lips, tongue and palate.

Talking, in the conventional sense of the word "talk," implies three inseparable but distinct things—voice, articulation and speech. The first is for sound, as in singing; the second for utterance of words; and the third for the expression of ideas. Voice by the larynx; articulation by the lips, tongue and palate; speech by the brain. Therefore, in disease of the nervous system, we have to attend to three things when we hear our patient talk: (1) The sound of his voice; (2) the articulation of his words; and (3) the sense of what he says, and how he says it. The third or mental defect is the one chiefly involved in the following cases.

M. Broca speaks of two kinds of loss of language; first, a loss of the general faculty of language; and second, a loss of the faculty of articulate language.

The first implies a total loss of power to communicate by words, by

[1] I mention the lips, tongue and palate together, as we often find them paralysed at the same time.

writing or by signs, or in short in any way whatever. If we ask a patient who has lost altogether the general faculty of language, a question requiring merely assent or dissent, he cannot reply even by a sign. He may nod, but not at the right time, just as when he can say but the word "no"; he will say this in return to any question, but really will be able to answer none.

The second is a loss of but one special form of language, viz., that by words. This—the loss of the faculty of articulate language, without any other mental defect—is what M. Broca calls aphemia. A person born deaf has no *articulate* language, but his general faculty may be well developed; and he may converse, not only rapidly, but with precision, by his fingers (deaf and dumb alphabet).

Aphemic patients, then, have lost but one special form of language, and, like the deaf mute, they can still express themselves by writing, signs, &c. So M. Broca finds that in such cases but one special part of the brain is invariably damaged, viz., *the posterior part of the third left frontal convolution.* This is the "convolution of articular language."

* * * *

Since M. Broca first drew attention to this subject, there has been recorded but one exception to his views as proved by an autopsy. In this unique case, the disease was very near, but did not involve, the third left frontal convolution. It was, however, so suspiciously near it, that one may well ask if there were not some minute changes in the convolution of articulate language which escaped observation. It is well known to all who have read Lockhart Clarke's papers, that parts of the nervous system which look absolutely healthy to ordinary examination, are often found to be much diseased when very carefully examined.

* * * *

The lesion occupied the (left) parietal lobe, and was prolonged across the fissure of Rolando as far as the transverse (left) frontal convolution, which was diseased just at the point where it is joined by the *third left frontal convolution.* In this last there was no lesion of any importance. It will be kept in mind that, in this otherwise exceptional case, the disease was on the left side of the brain.

Now, the word "aphemia," as M. Broca uses it, will not apply to the defect in most of the cases I am about to relate. In Case 1, it is clear, as Dr. Brown-Séquard pointed out, that the patient had lost altogether the general faculty of language, and not merely the most

particular manifestation of that faculty by articulate words. Inability to talk was, it is true, the most marked feature in the case, but it was not more characteristic than the inability to express ideas, by writing or by signs. It will no doubt seem a sweeping statement, but it is a fact that the patient never made me a reply in any way all the time he was in the hospital.

Yet it must be kept in mind that, as I have already said, M. Broca points out but one *limited part* (the posterior third of the third left frontal convolution) as the seat of the faculty of articulate language—as the part always damaged in aphemia—whereas, in at least some of the cases (of embolism of the left middle cerebral artery), I relate there will be far wider damage of the hemisphere. Not only will the "convolution of articulate language" be diseased, but many other convolutions as well. Therefore, although there is aphemia, yet there is something more; not only a loss of power to express ideas by words, but so much mental defect besides, that the patient cannot express himself in any other supplementary manner, and, in some cases, perhaps, cannot find ideas to express.

I must, therefore, keep to the word "speech," and use it as a general term for all shades of intellectual expression, from the most general to the most particular. This is, I admit, a vague way of using the word, but it would do far more harm to use a more definite term when precision is in reality impossible, and I must beg the reader to remember that it is not used in a dogmatic sense. It is used for the sake of arranging clinical facts, and not as a permanent definition. But I have, as far as I could, described the defect in recording each case, and it will be found that in many of them there is very much more than mere inability to utter words.

The reader will readily understand that it would not be very difficult to compile an essay on language or on speech. But I submit that it would be far from easy to translate into the special language of psychology the variable and undefined effects in the following cases. In a subject so wide and vague as language, it would be simple work to pile up ingenious theories, but to find a method to arrange the varying facts in many actual cases is quite a different thing.

Next, at the risk of being tedious, I enlarge on what I do *not* mean by loss of speech. I speak then of the two remaining factors of "talking"—voice and articulation—in order more effectually to exclude them.

It will scarcely be necessary to say much about voice. Aphonia

is always due either directly to disease in the larynx, or indirectly to disease of the nerves to its muscles. There is but slight risk that any medical man would take aphonia for failure of a mental[1] faculty, even if there were other symptoms of brain disease. For, of course, aphonia may be a symptom of disease of the nervous system; but it is never due to an injury of that part of the nervous system (the hemisphere) which is the seat of mind. But it must be kept carefully in mind that patients frequently do not make the distinction. A young woman, with chorea limited to the *left* side, told me the other day, in reply to a question, that she sometimes lost "speech." It turned out that she merely lost her "voice," remaining able to whisper, and on looking at Mr. J. N. Radcliffe's notes of her case, I found that the defect was described as "aphonia." Several of the patients can sing. I have heard one patient sing many a time after she had in a great measure recovered; but she always made mistakes in the words of the song, omitting some, slurring over others, and entangling the syllables oddly. I need scarcely say that a patient who has aphemia from disease of the brain might have, at the same time, aphonia from disease of the larynx, or its nerves. I have, however, not yet seen this coincidence.

Articulation[2] is the third element of talking. It is quite independent of voice. A person may articulate well (of course in a whisper) even when his throat is cut. I saw, a few months ago in the London Hospital, under the care of my colleague Mr. Hutchinson, a patient who could whisper, so as to be understood across the ward, when at the same time his vocal cords could be seen through a wound in his throat.

Now the muscles of the lips, tongue and palate are concerned in two chief actions, articulation and swallowing. When a patient talks badly from defective power in these parts, it will, I think, be generally found that they act badly in swallowing too. Whereas, patients who talk badly from any degree of loss of speech (i.e., as I use the word "speech" in this paper) can swallow quite well. The contrast in this respect between a patient who cannot speak at all from disease of the hemisphere, and one who cannot utter a word from defect in the

[1] Voice is the chief outlet of the emotion. It is shared by animals. It expresses various states of feeling common to man, rather than ideas special to the individual. It gives by varying tones, an eloquence—the "fusion of passion"—to the speech of the most uneducated, and knits up loose and incoherent talk in a language common to all mankind. It is, in speech, "the touch of Nature," &c.

[2] I here mean by defect of articulation, a defect due to want of power in the tongue, lips and palate themselves, and not the defect I shall further allude to in connexion with the talking of patients recovering from aphemia, which is a want of power to co-ordinate movements for the utterance of syllables.

muscles concerned in articulation, is very striking. The former eats and swallows readily, the latter with the very greatest difficulty. I do not say that there is an exact relation, but there is certainly a general one between the perfection of the two actions, articulation and swallowing. This is worthy of more consideration than appears at first glance. I am convinced that from neglect of it many cases of confused talking (defects of articulate language), and which are in reality due to disease of the hemisphere, are put down to want of power in the muscles of the lips, tongue, &c. Patients who have unilateral chorea on the right (and indeed now and then on the left) side, talk in this way.

As I have said, there is hemiplegia in nearly all the cases. Now, in hemiplegia generally—i.e., in uncomplicated hemiplegia—there is a little paralysis of the face, and a little of the tongue on one side. It is just possible, then, that it may be said that some of the patients whose cases I describe—for instance, H. D.—could not talk, or talked badly, on account of this slight paralysis of the face and tongue. It is quite true that hemiplegic patients do talk badly, and in a very few cases they do so permanently, when this paralysis of the face and tongue is greater than usual. But it is quite evident that it can have nothing whatever to do with such a defect as those patients have who can only say "no," and more markedly with such an one as calling a "chair" a "potato," especially when we find that very often the patients know that the words they use are wrong. To put down mistakes in the relation of words to things to defect in the muscles of the lips and tongue, reminds one of the excuse a gentleman once gave for bad spelling, viz., that his pen was a bad one.[1]

Moreover, the defect in articulation nearly always passes off in a few days. The only thing with which it could at all easily be confounded is the talk of aphemia, when there is not loss, but defect of articulate language; but here the ear quickly detects the thick

[1] Just as we analyse various defects in expression, so we ought to be careful not to confound the varieties of disorders of its corresponding opposite, perception. For instance, all know the anecdote of the gentleman who went out to shoot with three dogs, and suddenly saw six. Contrast that with the following: I had a patient under my care for epilepsy, whose fits were always preceded by an apparition of a green cart, and another who saw constantly an eye and part of a face. The illusion from double vision (probably due to paralysis of the external rectus on one side) is as different from the two cerebral illusions just related as defect of talking from paralysis of the tongue is from loss of the mental faculty of language. I mention this here, as it is obvious that, to make any real progress, the general and particular manifestations of perception and of expression must be studied *pari passu*.

speech, due to want of power in the lips and tongue, from the confusion of syllables of patients who are partially aphemic, or who are recovering from aphemia. To hear the two is better than pages of description. When a hemiplegic patient talks in an unintelligible gabble, although able to move the tongue in any way, and if we learn that he was for some time after his seizure quite speechless, we may, I believe, be certain that the defect is due to disease of the hemisphere, near the corpus striatum, and probably of the convolution of articulate language of Broca.

Further, total paralysis of the face, i.e., on both sides, does not render a patient unable to talk. Neither does total paralysis of the tongue on *one* side. But when the tongue is totally paralysed on each side, it is just possible that a mistake might be made. The most marked event would certainly be the same, viz., that the patient did not talk, but the real fact would be quite different. The patient with paralysis of the tongue could not get out his words, whereas the patient who has lost speech altogether could not think of any words to get out, or, if he could, could not get them passed through the convolution of articulate language.

I may here most conveniently speak of the writing of patients who have lost speech. It is often most trustworthy evidence as to the difference betwixt dumbness from total loss of the general faculty of language, and from abolition of power in the tongue, lips, and palate. If the patient have enough power in the right hand we should set him to write, or try to get him to do it with the left. If the dumbness were due to mere local paralysis of the lips, tongue and palate, the patient ought to be able to express ideas in writing as well as before, however bad his penmanship might be. But if he could not write, or if he wrote gibberish, or made mistakes, it would be evidence that the defect was a mental one, for it would show that the faculty of expression generally was injured, and not merely the power of uttering words by the muscles of the tongue, &c.

Dr. Fletcher's and Dr. Ransome's case is a very excellent illustration of this. "It was a remarkable feature in the case that, although perfectly conscious, she could not, for more than a week, recollect the words she desired to write on her slate, and would very often use wrong words; indeed, it was some weeks before she could always recollect the words she desired to use." A more striking case even than this was lately mentioned to me by Dr. Barlow. A colleague of his told him that he had attended a gentleman who had been seized with

paralysis (on which side is not known) and loss of speech; the patient could only say "r," "r," "r." When pen, ink and paper were given to him, he could only write a succession of the same letters.

When, however, the faculty of language is but partially lost, when there is a loss of *articulate* language only—aphemia—the patients can write. Dr. Wilks, a few days ago, showed me a girl who had suddenly lost speech and power on the right side, and who could only say "gee," "gee"; yet she wrote her name with her left hand correctly. This showed that, in her case, the general faculty was good; and it was further confirmed by the fact that she could make signs readily and with correctness. In this case the patient could put the tongue out, and could move it in any direction, and could eat and swallow perfectly. This was, then, a pure case of aphemia.

To return now to further distinctions betwixt dumbness from paralysis of the tongue and from loss of the faculty of language. A patient who has any great paralysis of the tongue would have some paralysis of the palate as well. But the most decided test is that the patient who has lost speech can put out his tongue; but when the tongue itself is paralysed, of course it cannot be moved. This is a very simple distinction, but it is not always applicable; for although patients who have paralysis of the tongue cannot, it is equally a fact that patients who have lost speech frequently do not, put it out when asked. And this is generally the case soon after the attack, when, for purposes of diagnosis, it is most desirable that the patient who has lost speech should put the tongue out. Now this loss of voluntary power might be recorded as "total paralysis of the tongue." To put on one side the great improbability that total paralysis of the tongue on each side should occur with paralysis of the arm and leg on one side only, the tests of eating and swallowing will readily demonstrate that there is simply loss of voluntary power, and not an incapacity in the tongue itself or its motor nerves.[1]

If the patient lives, he sooner or later gains power to put out his

[1] I may say, too, that I have never seen paralysis of the tongue, i.e., decided paralysis, even on one side with pure hemiplegia. There is generally weakness, affecting all four limbs, although the limbs on one side may be weaker than on the other. I state this as a mere matter of fact, but it is easy to explain it by anatomy. The nuclei of the ninth nerves are embedded very near the decussation of the fibres from the limbs, so that an injury involving the nucleus of even one side would be, from continuity, likely to damage the motor fibres of both sides of the body—those on one side before, and those on the other after, they had crossed. On the contrary, in every case of loss of speech that I have seen, the paralysis of the limbs, when there was any, has been on one side only; the paralysis has been definite hemiplegia.

tongue, although he may not speak any better; for instance, one patient had hemiplegia on the right side, and could only say the one word, "awful," but this word he said distinctly. The tongue acted quite well in the semi-voluntary acts of eating and swallowing, but voluntary control seemed absent, for he did not put out his tongue when I asked him, although I tried for some time to get him to do it. At my second visit he did so readily, and continued to be able to do it, when told, for the month he was under observation.

In such cases it will certainly be better to record the fact that the patient does not put out his tongue when told, than the inference that it is paralysed. I have several times seen patients put their fingers in their mouths as if to help the tongue out. Here, again, we shall do no harm to clinical medicine if we simply record all the facts. It is better to say that "the patient, when asked to put out his tongue, evidently knows what is wanted, as he puts his fingers in his mouth as if to help it out, and yet does not protrude it in the least," than the following: "there is total paralysis of the tongue." The first is a statement of facts, and gives the reader a basis to think from; the second a theory which is, on the face of it, improbable, and if a wrong one, all the more dangerous that such a theory often passes for a fact. In one published case of embolism of the middle cerebral artery, soon followed by death and autopsy, it is recorded that the patient did not speak *plainly* from paralysis of the tongue.

It may, perhaps, seem that I dwell too much on this point. One reason for doing so is that I have been very much puzzled by it, and another that it is obvious that the distinction is a most important one. For, suppose a patient dies in the stage in which he does not put out his tongue, the observer, if he had diagnosed "total paralysis of the tongue," would examine the medulla oblongata microscopically. Let us suppose, to make the illustration more definite, that the specimen is carefully and laboriously examined in the proper way, and is found to be free from disease. Here, then, would be a field for speculation; "total paralysis of the tongue, and no organic change in the nervous centres." In such a case the more distinguished the observer the more disastrous would be the consequences to medical science.

I now give the steps by which I arrived at my conclusions, as the simplest way of stating what I have to say.

I noticed that in nearly all the cases of loss of speech that I had seen there had been hemiplegia. I can now only call to mind seven cases of loss of speech at the Hospital for Epilepsy and Paralysis in

which there has been no hemiplegia; and of these three had had epileptiform convulsions on the right side; in the fourth the convulsions were said to have affected both sides.

Now, the strangeness of this association—the loss of a purely mental faculty with paralysis of the limbs on one side—made me think frequently on the subject, and seek for some explanation of the concurrence of the two symptoms. For here are (if I may use the expression) two incoherent symptoms—yet each of them quite definite—coming on suddenly together. Then, apart from this, I often wondered how it was that there were no ill-defined mental symptoms in cases of embolism of the middle cerebral artery. This vessel supplies the corpus striatum, the highest part of the motor tract, and hence the hemiplegia was easily accounted for; but it also supplies a vast tract of convolutions, and, therefore, one would, a priori, expect to find decided symptoms of mental failure. (This difficulty still remains in respect to cases of plugging of the right middle cerebral artery.) But it was not very difficult to put this on one side, as there are many records of cases of extensive disease of one hemisphere with no symptoms of any kind, at least none that could be detected. It is generally held that the brain is a double organ, and that if one hemisphere be damaged the other will answer the ordinary intellectual purposes of life. The recent researches as to the seat of the faculty of language render this at least doubtful.

Of course I examined the heart in cases of hemiplegia, almost as a matter of routine, just as I did the urine, and in some cases I found valvular disease, and in some I did not. It occurred to me, however, that in cases of hemiplegia with loss of speech, there was nearly always valvular disease, and I then imagined that plugging of the middle cerebral artery might account, not only for the hemiplegia, but, by producing softening of part of the hemisphere, for the loss of speech too. In the cases I first got together for a paper, read at the Hunterian Society, the frequent coincidence of valvular disease was very striking. Of nine cases there was valvular disease in six; but since I have collected many more cases the proportion has been very much less.

In each of the first nine cases the hemiplegia was on the *right* side, indicating, of course, disease on the *left* side of the brain, and, as I further inferred from the heart disease, plugging of the middle cerebral on the *left* side. This was a prominent feature, but I then thought that it might be only a coincidence. When I had reached twenty cases it became more strange; and now that I have seen one exception I cannot but feel that it is very remarkable.

Of course, hemiplegia is not a necessary accompaniment of loss of speech. These two symptoms frequently occur together simply because the part of the hemisphere in which is the seat of the faculty of language, or of articulate language, is near the upper part of the motor tract—the corpus striatum; so that, from mere relation of contiguity, they often suffer together. What damages one of these parts is very likely, at the same time, to damage the other, or afterwards to extend to it; or, as I suppose happens in cases of embolism, because both of these parts are supplied by branches from one arterial trunk—the middle cerebral—so that when the vessel is plugged both lose their supply of blood at the same time. But just as hemiplegia (on the right or left side) occurs without loss of speech, from the lesion being confined to the motor tract and not extending to the convolution of language, so the converse, loss of speech occurs without hemiplegia, the lesion then being confined to the convolution, or convolution of language, and not extending to the motor tract. M. Broca has seen three cases of traumatic and two of spontaneous aphemia without any paralysis. Then, as I have already remarked, we have loss of speech with convulsions on the right side; but to this point I shall refer later.

Yet the frequent connexion of loss of speech with hemiplegia is striking. A reference to Romberg, Abercrombie, Todd, Forbes Winslow, &c., will show this. Dr. Watson relates one case; Mr. Dunn has recorded a very interesting one (*Lancet*, October 22, and November 2, 1850). In Dr. Watson's, and in Mr. Dunn's case the hemiplegia was on the right side.

As I have said, most of my cases are chronic, and I have had no decisive autopsy on any one of them. When the middle cerebral artery is plugged the patient is often killed by this accident. Sometimes he becomes hemiplegic, and, as I believe, in others, subject to unilateral epileptiform seizures. Now, of course, I cannot be absolutely certain that embolism was the cause of the symptom in the following cases, not even in the cases of valvular disease, but I submit that it is almost certain that it was in most of them.

Syphilis certainly does produce disease of arteries, and thus one of the vessels of the brain may have become plugged from coagulation of blood on its roughened surface; if of the middle cerebral artery, hemiplegia would result. The common way, however, in which syphilis produces hemiplegia is by inducing disease on the surface of one hemisphere. There must, of course, be some secondary disease in the

motor tract as well, but the obvious *post-mortem* change is disease in the pia mater on the surface of the hemisphere.

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[Here follows a description of 38 cases of speech defect associated with hemiplegia. The clinical records are short, and do not add materially to our present knowledge. They show conclusively that embolism and syphilitic vascular disease affecting the left hemisphere may cause loss of speech. Throughout these reports of cases interjected comments show how many of the author's views on disorders of speech were already formed, to be expressed more fully later. The longest and most important of these comments, an addendum to Case 32, on the nature of "Swearing," is here reprinted as the close of the paper.]

* * * *

Swearing is, strictly speaking, not a part of language. It is a habit which has grown up from the impulse to add the force of passing emotions to the expression of ideas. It belongs to the same general category as loudness of tone and violence of gesticulation. The distinction of these from language as an intellectual act, may be best illustrated by the remark Dr. Johnson once made to a boisterous antagonist, "Sir, you raise your voice where you should enforce your argument." Although oaths differ from mere alterations of tone, in that they consist of *articulate words*, they are generally used in talking, not to express ideas, but to make up by vigour in delivery what is wanting in precision of expression. They may, indeed, be considered as phrases which emotion has filched from the intellect, to express itself in more definite terms than it could do by mere violence of tone or manner. For oaths had once an intellectual meaning; they expressed ideas, and were uttered with a definite intention. Curses have, in fact, formed an element in all religious services; but nowadays intentional cursing is obsolete; it has degenerated to meaningless swearing, which, like cadence and gesticulation, is but a kind of commentary of the emotions on the propositions of the intellect. Vulgar people insert an oath "at the proper intervals of their speech," as a sort of detonating comma, and thus they render forcible statements which might otherwise strike their hearers as commonplace.

Upon this broad principle, too, that ejaculatory expressions are prompted by the emotions and not by the will, we may explain the expression, "—bless my life!" surprised out of the patient, Mrs. H., by a sudden and unusual excitement. It was the more remarkable here,

as these were the only real words, except "yes" and "no," the patient ever uttered. It is clear that such a phrase is used with the same levity as an oath, and without any intention to express the idea which the words really imply. It is not used with the intention of *saying* anything. In the instance referred to the expression was excited just in the same way as an oath in Case 1. The only word that that patient ever uttered during his stay in the hospital, except "yes," which he could utter at any time, was an oath he once brought out when he was irritated. The difference of sex will probably account for the difference in the form of the ejaculation in the two cases. Even words so simple as "Oh dear! oh dear!" when used in anger or vexation, belong to the same category, for then these words, like an oath, are used rather as the clothing of the feeling than for the expression of an idea. I submit, then, that oaths and similar interjectional expressions, are not parts of speech in the broad sense in which the words that form them are, when used to convey intellectual propositions.

Perhaps the explanation of the way in which these phrases are, so to speak manufactured is that they are reflex. Indeed, although very rudimentary mental processes, they seem to me to illustrate the doctrines of Professor Laycock on the reflex function of the brain, and especially illustrate his views. It is quite obvious that they are not voluntary, as the patients cannot repeat the phrases. The will cannot act, but, somehow, an emotion, e.g., anger, gets the words passed through the convolution of language. Just as a paralysed foot will jump up when the sole is tickled, so these words start out when the mind is excited. Such ejaculations as I have mentioned would have become easy of elaboration by long habit, and would require but slight stimulus for perfect execution.

The following instance seems to belong to the same category, although the action was a less fine one, and the stimulus more coarse and definite.

Some years ago, I was on an omnibus, and we were kept some time, as one of the horses would not start. Various plans were tried to overcome its stupidity, but without success. At last the driver directed the conductor to shut the door violently (this is a usual signal for starting). To my great surprise, the horse went on at once. The horse would not exercise his will to move; the patients could not exercise theirs to talk. But the movement required was surprised out of the unwilling horse by a noise to which he was accustomed

to hear in starting. So the anger or surprise being the stimulus under which they had been uttered when the will was sound, gave rise to ejaculations in the patients whose voluntary power to talk was lost.

I have a patient, the subject of chorea, who, for several years, has been in the habit of saying, quite involuntarily, the word "bloody." A few years ago, he was frightened by a man shouting the word after him. The fright produced chorea, and, if I may use such a term, chorea of his mind, too; as, for three days, he said the word "bloody," and little else; and now he ejaculates it occasionally. The mental process for saying that word is as little under his control as a few of the muscles of his face are, for the twitching of which he is now attending at the London Hospital.

CLINICAL REMARKS ON EMOTIONAL AND INTELLECTUAL LANGUAGE IN SOME CASES OF DISEASE OF THE NERVOUS SYSTEM.

[*The Lancet*, February 17, 1866, vol. i, p. 174.]

Development of the Difference between Emotional and Intellectual Expression.

At a recent visit to the London Hospital, Dr. Hughlings Jackson pointed out to us the case of a man who had lost speech, and who was paralysed on the right side. We have already given a *résumé* of Dr. Jackson's views on cases of this kind (*Lancet*, November 26, 1864); and now we speak on different aspects of the same subject as illustrated by cases under his care at the London Hospital and at the National Hospital for Epilepsy and Paralysis.

The patient we saw could only say the word "dick," and this word he uttered whenever we asked him a question. We were told that when the man was vexed by the other patients in his ward he would swear. He generally used the common explosive sound so much in favour with English swearers. He could not, however, say the word when required to do so, even whilst it was well kept before his mind by frequent repetition. He seemed to make efforts to say it, but the word "dick" always came out instead. The oath was only uttered under the influence of emotion, and could never be repeated at will. Oaths—that is, as they are vulgarly used—are little better than more or less highly compound interjections. It is not safe, then, to conclude that a patient who has lost speech is regaining power of language because he begins to swear when he is excited. By such words no part of a proposition can be conveyed; that is, they add nothing to precision of expression in delivering an idea, although they may help the speaker to show states of feeling, and thus to excite sympathy. Where no proposition is conveyed, there is no intellectual language. It is true that some oaths, considering the mere arrangement of the words, are in the form of a proposition; but they are used without any thought as to their real meaning. They are, in effect, but signs

of states of feeling, like interjections, and do not help an affirmation or a denial of any quality about anything. The utterance of such interjections as "ah!" "oh!" is certainly no proof that the patient has any power of language in the sense of being able to convey an intellectual proposition. The same remark applies to any real words which the patient utters without being able to *use* them, and evidently to the fragmentary jargon some speechless patients utter so copiously. A patient who had been under Dr. Jackson's care at the Hospital for Epilepsy and Paralysis, and who is still under his observation, can utter such words as "lor," "deah," "me." It would be safer to call these fragments "sounds" rather than words, as they are but rags and tatters of talk. They are certainly not what are properly called "parts of speech," and are of no use whatever to this patient in the way of conveying any intellectual meaning. She can utter the words "yes" and "no," but can hardly be said to *use* them, so that even these are scarcely words to her. Dr. Jackson said that he could never satisfy himself that she had any power of conveying a proposition, either by words or even by more simple signs than the conventional sounds of spoken words. Latham says, "Without propositions there are no questions, commands, or declarations; and without questions, commands, or declarations, there would scarcely be such a thing as language. The little there would be would consist merely of exclamations like 'oh!' 'ah!' 'pish!'" Max Müller says, "Language begins where interjections end." And even if language may have arisen from interjections, according to the theory which Max Müller calls the Pooh-Pooh Theory—and which theory he tries to disprove—interjections are not, in the present developed state of language, parts of speech in the sense that nouns or names are. "It is in names," says Hegel (quoted by Max Müller), "that we think." If so, it is in names only that we can speak. But, although interjections and analogous sounds are not parts of intellectual language, they are important parts of the framework of emotional language, and thus help the proposition in a subordinate way.

Here Dr. Jackson referred to Mr. Herbert Spencer's essay, "The Origin and Function of Music," to which essay he was, he said, indebted for anything of value he might have arrived at as regards the distinctness of intellectual and emotional language, and their relations to one another. The following quotation gives but an incomplete idea of Mr. Spencer's views, but it will serve our present purpose: "All speech is compounded of two elements, the words and the tones

in which they are uttered—the signs of ideas and the signs of feelings. While certain articulations express the thought, certain vocal sounds express the more or less of pain or pleasure which the thought gives. Using the word *cadence* in an unusually entended sense, as comprehending all modifications of voice, we may say that *cadence is the commentary of the emotions on the propositions of the intellect.*"

The jargon the poor woman could utter, although of no use in conveying her ideas, helped her to show her varying states of feeling. Indeed, in this instance, intellectual language was nearly, if not entirely wanting, whilst emotional language was quite perfect; moreover, in this instance, the latter was highly developed. She could easily show that she was pleased or vexed: but the cause of her pleasure or vexation could only be guessed at.

When excited she could vary her tones in the most remarkable way, and would say "ah! ah! me! me!" in the most violent, or at times in the most plaintive, manner. It may be just remarked, in passing, that her emotional expression was in great part natural to her, and was not of that sort one so often sees in cases of softening and of extensive brain disease generally. She had always, her husband said, been excitable and fond of excitement. She would, before her illness, at any time get up in the night to go out to a fire.

Now it will be observed that some speechless patients can sing. Dr. Jackson did not allude to this fact in order to show that voice was unaffected when speech was affected, as, so far as he knew, there was no a priori reason to expect that voice would be lost when speech was lost. The distinctness of voice from articulation is well recognized, and with loss or defect of speech from disease of the hemisphere, aphonia never occurs, so far as Dr. Jackson has observed. The difficulty of articulation from paralysis of the tongue and palate which occurs with aphonia from paralysis of the vocal cords clearly depends on disease in the medulla oblongata, and is quite a different thing. It is only mentioned here in order that it may be expressly excluded. It is needless to say that deaf-mutism is a kind of loss of power to talk which is not considered in these remarks.

There is now attending at the Hospital for Epilepsy and Paralysis a boy suffering from epilepsy, aged 3, who can only say the words "mam, mam," and "dad, dad." It was evident from his general conduct that the boy's mental condition was much below par. Dr. Jackson remarked this to the child's mother, as it was very desirable that the real state of things should be recognized in order that the

child might have proper training. The poor mother said eagerly in reply, "But he has such a wonderful idea of music." She averred that he could soon learn to hum any tune he heard his father play on his flute. He would, however, never hum a tune when he was told to do so, nor, indeed, would he do as he was bid at any time, partly from inability, but also from wilfulness. Dr. Jackson has also seen another boy who had had loss of speech after attacks of epilepsy or epileptiform convulsions, and who it was said could sing, although he could not talk. As, however, in neither of these instances had he heard the child sing, he would again take the woman's case as an illustration. She could sing, and readily sang a song her husband told her to sing "about Boney party," using the sounds "lor," "deah," "me," instead of words. She varied her voice properly.

Still, having reference to Spencer's views, it seems, Dr. Jackson said, that we may conclude that our muscles may be used in two kinds of language, one intellectual and the other emotional. But the muscles may, in some cases of disease of the hemisphere, be readily put in action for most purposes, when they cannot be used to make signs by words or by pantomime. Although this woman's vocal and articulatory muscles are quite unimpaired, so that she can smile, laugh, chew, eat, drink, swallow, cough, sing, &c., she cannot repeat words said to her, and cannot in any way—putting words out of the question—make signs by her lips, &c. Again, although she can gesticulate, and does so frequently, she cannot make signs with her hands, or at the most only with very great difficulty. The following extract from Dr. Jackson's notes gives a good illustration of how well she can use her muscles in varying emotional conditions. It ought to have been mentioned that this patient had had hemiplegia of the right side at the date of the first attack several years ago. From this, however, she soon recovered.

"In order to develop her gabble, her husband said: 'Go and talk to that bird.' She went to the cage, which was hanging from the ceiling in one corner of the room, and, standing up, cried: 'Ah! ah! O deah! deah! deah! Pittymy, pittimy. Lor, lor, lor,' &c. She seemed quite delighted with her task, and varied her voice wonderfully, uttering one set of the gabble in one tone, and the others in other tones. At the same time she gesticulated incessantly, throwing her arms up and down, seeming to accompany her voice with a sort of dance of the arms."

These rhythmical movements are of importance in their relations to cadence. Spencer says: "A smile, which is the commonest expression of gratified feeling, is a contraction of certain facial muscles; and, when

the smile broadens into a laugh we see a more violent and more general muscular excitement produced by intenser gratification. Rubbing together of the hands, and that other motion which Dickens somewhere describes as 'washing with impalpable soap in invisible water,' have like implications. (Was it not Hood who said 'washing his hands with invisible soap in imperceptible water?') Children may often be seen to 'jump for joy.' Even in adults of excitable temperament an action approaching to it is sometimes witnessed. And dancing has all the world through been regarded as natural to an elevated state of mind."

The woman would dance when a barrel organ was played in front of her house. Thus, then, she could use her laryngeal muscles not only to utter single sounds like "ah! oh!" but also in the complex process of singing. Again, she could not only use her hands in simple gesticulations, but could use her legs in the more cultivated movements of dancing.

There was no reason to suspect that this patient was hysterical. Dr. Jackson said he had no reasonable doubt that there was disease of the convolutions near the left corpus striatum. Perhaps the corpus striatum was itself somewhat involved, but not very much, as the hemiplegia had been but transitory.

NOTES ON THE PHYSIOLOGY AND PATHOLOGY OF LANGUAGE.

[*Medical Times and Gazette*, June 23, 1866, vol. i, p. 659.]

Remarks on those Cases of Disease of the Nervous System, in which defect of Expression is the Most Striking Symptom.

There are two modes of expression, one emotional and the other intellectual. By one we show what we feel, and by the other we tell what we think. We may show that we are surprised, angry, grieved, or astonished by the former, but by the latter we give to another by signs (generally words) a notion of our thoughts on things. Now, in some cases of disease of the hemisphere (always, in my experience near to and involving the left corpus striatum), intellectual expression is wanting, and emotional expression is well preserved. But we may make the statement broader still, at least in some cases. In some cases of defect of speech the patient seems to have lost much of his power to do anything he is told to do, even with those muscles that are not paralysed. Thus a patient will be unable to put out his tongue when we ask him, although he will use it well in semi-involuntary actions, e.g., eating and swallowing. He will not make the particular grimace he is told to do, even when we make one for him to imitate. There is power in his muscles and in the centres for the co-ordination of muscular groups, but he, the whole man, or the "will," cannot set them a-going. Such a patient may do a thing well at one time and not at another. In a few cases the patients do not do things so simple as moving the hand (i.e., the non-paralysed hand) when they are told. This sort of difficulty generally, however, clears up long before power to talk returns. There is in health a great difference in the power individuals have to do things they are told to do, e.g., to draw in their breath.

I wish here to urge on students who are studying cases in which defects of expression are the most striking symptoms, to work at them from healthy language and through slight defects down to total inability

to express anything in any way. Again, we must think of them as defects of mind, as well as of that part or phase of mind which enables us to think aloud in words. And we must never forget that in disease of the hemisphere we may have now and then, besides mental symptoms, amaurosis, epileptiform seizures, bilious vomiting, retracted belly, congestion of the lungs, constipation, and irregular pulse; for the brain is not only the "organ of mind," but it is the nervous system of the nervous system. It need scarcely be said that words, especially such as "mind," "sensory," "motor," &c., fetter our thoughts as well as define them.

Although the difference in the execution of voluntary and involuntary movements is very striking in some cases of loss of speech, the degree of loss of power to utter words must not be taken as a certain index of this difference. The difference probably depends on the difference in quantity of brain damaged near to (as well as in the exact relation of the part damaged to) the highest part of the motor tract, the point of emission of the orders of the "will" to muscles and to centres for muscular groups. Anyone who has tried to use the ophthalmoscope, in many cases where speech is lost or defective, will find how great the difference is in different cases. Thus one of my patients in the London Hospital had power only to say "yes" and "no," and yet the examination of his eyes was an easy matter. He has since rapidly recovered, and soon regained power to make signs for what he wanted. He had lost power to execute, not all movements, but those movements which are most artificial. Dogberry believed that reading and writing (and doubtless talking, although he did not say so) came by nature, but I suppose everybody else believes they are acquired by education. This patient cannot write, but he can copy correctly from a book with his left hand.

A few months ago a patient came under my care who could only say "pooh! pooh!" and an examination of his eyes was almost impracticable. He made efforts, but he never did what I told him, whether it was to look in a particular way or to keep his eyes still. Instead of opening them, he opened his mouth, or screwed up his face, or shut his eye, and could not be got to look in any particular direction, although he seemed to be on the alert to act, and was all the time doing something with his muscles. In this case I have little doubt that more of the brain was affected, and more of the corpus striatum than in the other patient. This patient is almost as bad now as he was six months ago, and still never does anything I ask him to do.

In a third patient who (and who, by the way, is hemiplegic on the left side, and now has much recovered speech) was unable to talk, the ophthalmoscopical examination was at first almost impracticable. Now, it may be said that the patients do not know what we wish them to do. But the last-mentioned patient, when told to "look at my finger," seemed to know what was wanted, for when I was about to give up in despair, he took hold of my little finger as I guessed, deprecatingly, and as much as to say he knew what was wanted, but could not do it. There can, however, be no certainty in this instance. It may be my fancy. But it will be observed that a speechless patient who cannot put out his tongue when told will sometimes actually put his fingers in his mouth as if to help to get it out, and yet not infrequently when we are tired of urging him, he will lick his lips with it. Now, as a rule, the worst of these patients can generally smile, and all such involuntary processes go on well enough. I say generally, for a physician who has seen many cases of defective speech will be obliged to use such words as "generally." I can call to mind but one speechless patient who did not become able to smile; but this patient (now under my care) never does anything but look about him, and eat and drink, and utter the word "yes" when anything is said to him. He will, however, cry "Oh!" and grin when his rigid (right) paralysed arm is extended. He takes his food when it is put near him; but when the nurse (at my request) "forgets" to give him his breakfast, he never makes any signs for it, although he follows her about with his eyes. He will, however, I have little doubt, begin to smile soon. He has only been ill a month. These patients can do things which require scarcely any, if any, education to do, or for which, in other words, the centres exist ready to co-ordinate muscles. It would seem that the centres for the emotional and the semi-voluntary and involuntary actions are in the pons, medulla oblongata, and spinal cord, but where the power is that sets them a-going is not clear.

There are plenty of facts to show that in disease of the corpus striatum those muscles less under the control of the "will" escape, and that through this, the highest part of the motor tract, we are able to direct our *limbs* voluntarily. The views of Mr. Dunn on the relation of defects of speech to disease of the corpus striatum are, I think, of great value in this connexion. Again, there is no more difficulty in supposing that there are convolutions near the corpus striatum for superintending those delicate movements of the hands which are under the immediate control of the mind than that there is one, as Broca sug-

gests, for movements of the tongue in purely mental operations. The phenomena of chorea, I believe, point to this conclusion.

I must here say that I believe less in some of the views propounded by Broca than I did, although I think the scientific world is under vast obligation to him for giving precision to an important inquiry. Yet I cannot but think that my disagreement with M. Broca, as well as many of the differences of opinion on this subject, are to a great extent due to different ways of putting the same thing. (See quotation from M. Broca's pamphlet.) Indeed, I think the evidence I have collected goes to confirm many of his statements as to facts, but I have for some time ceased to go with him in a few of his inferences. (See [1].) I think, then, that the so-called "faculty" of language has no existence, and that disease near the corpus striatum produces defect of expression (by words, writing, signs, &c.), to a great extent, because this is the way out from the hemisphere to organs which the will can set in motion. Hence, as I believe, disease of the convolutions near the corpus striatum is the cause of chorea, which, as regards the limbs, is not so much a disorder of mere motion as disorder of those movements which are voluntary and educated, or at least co-ordinated.

On the education of voluntary movements Bain has some most valuable remarks, and with reference to his views it is not unimportant to draw attention to the fact that chorea is a rare disease either before these movements have been learned or after they have been fully acquired. Unilateral epilepsy seems to replace, and sometimes, I think, to displace, chorea, and both run into actual hemiplegia occasionally.

So much for the superficial distinctions as regards the nature of (and seat of the centres for) voluntary and involuntary motion, and now for the resemblances of the two.

It may seem to be a wilful contradiction, but we find that a patient *does* things involuntarily which he cannot do voluntarily. At all events, these so-called speechless patients give utterance not merely to words, but to words in a relation which gives them at least the appearance of language. I have elsewhere spoken of swearing and of other similar ejaculatory sentences. These seem to border on emotional actions, or, as I have already put it metaphorically, "oaths are phrases which emotion has filched from the intellect to express itself in a more definite way than it could do by mere loudness of tone or manner." We scarcely say anything when we swear, although we utter words in relation. The secret of the perfect utterance of these phrases, which in "speechless" patients are obviously not voluntary, is they are easily elaborated by long

habit, and can thus be brought out by a slight stimulus. Such facts seem to me to be of great importance as illustrating Laycock's doctrine on the reflex function of the brain. Indeed, the study of swearing, in spite of the nastiness of this habit, is one of the very greatest interest and importance, in our attempts to trace the graduations of motion, thought, and language.

But I now wish to speak of utterances which are, perhaps, of the same category as the others, but which seem to be rather expressions of the whole mind, as thinking of particular things, and yet which, contradictory as it may seem, the mind cannot get out when it likes. It will be found that patients who usually cannot talk will sometimes utter a real sentence. Laycock ("Mind and Brain," vol. ii, p. 433) has some most important observations on this subject. He says (and this, I think, helps to show the continuity, with differentiation, of these utterances with emotional utterances like interjections) that "a person, usually speechless, under violent emotions may speak. A similar thing is observed with regard to laughter. A person with local disease cannot laugh voluntarily, but he can involuntarily." We had at the Hospital for Epilepsy and Paralysis a patient who could not keep from laughing, even when asking for help in his distress.

The patient, who utters the sound "pooh, pooh!" never said a single word to any of the nurses or students of the hospital for some months, yet his son assures me that his father once, by saying the word "master's," told him where his tools were, and that he once said, with difficulty of articulation, but with intelligibility, "How is Alice getting on?" Although I have always given place to such statements by patients' friends, I confess that I have more than once almost felt that I was giving place to error in recording in my notes statements made to me about the occasional utterances of patients who would never speak to me. I have recorded (see *Royal London Ophthalmic Hospital Reports*, vol. iv, part 4) the case of a "speechless" patient who was said to have one day asked for chops, although I confess that I did not then believe it. I do now. My past unbelief was brought to my mind forcibly the other day. A most intelligent student gave me the particulars of the case of a patient who died with disease of the left hemisphere. Soon afterwards I was talking to this gentleman of such utterance as I have mentioned. He remarked to me that this patient's wife had, with indignation at his (the student's) incredulity, affirmed that her husband, otherwise always speechless, said, "God bless you, my dear." Now, my friend was quite justified in being very incredulous, but I ventured to tell him that it was

better to record such statements, although on the authority solely of the relater.

Dr. Martin, of St. Bartholomew's Hospital, has had the great kindness to allow me to mention a case of loss of speech which occurred in his practice. It is the more important, since Dr. Andrew tells me Dr. Martin clearly located the disease, and predicted its nature during the man's life. I have Dr. Martin's permission to make use of the case, but the following quotation from the notes I got from the patient's wife will serve my present purpose: "She told me the following as the only words she had heard him say besides 'No,' since he lost his speech (March 8) to his death (May 15): 'Five nights, six nights, seven nights, and then five nights out of seven.'" These words she assured me he spoke very clearly indeed, and she fancied he wanted to tell her something, but what it was she could only guess.

In nearly all the cases recently observed of loss of speech with hemiplegia the paralysis has been on the right side of the body, indicating disease of the left side of the brain. To explain this, Dr. Moxon suggests that the left side of the brain only is educated, although there is "an organ of language" on each side. I believe this hypothesis is essentially a most important one, but I differ from it in one way, although, of course, I can be but speculating. I think both sides are probably educated, but that the left is the one that begins to act, and that those educated utterances, which are in a sense involuntary, have become so by habit—i.e., frequent education—and may be the result of action of the right side only. How from the right side they are set a-going I do not know any more that I know how a person laughs, not only without effort, but even when he tries to keep quiet.

M. Baillarger has already, I find, considered this question in an admirable manner. He says: "L'analyse des phénomènes conduit à reconnaître, dans certains cas de ce genre, que l'incitation verbale involontaire persiste, mais que l'incitation verbale volontaire est abolie. Quant à la perversion de la faculté du langage caractérisée par la prononciation de mots incohérents, la lésion consiste encore dans la substitution de la parole automatique à l'incitation verbale volontaire." In the following sentence apropos of a particular case, he speaks more generally: "Il est bien évident qu'ici l'incitation motrice volontaire était abolie et que l'incitation motrice spontanée persistait." M. Baillarger refers to cases recorded in Dr. Forbes Winslow's remarkable and valuable work "Obscure Diseases of the Brain."

M. Baillarger has also made some very important observations on

incoherence in cases of loss of power to talk voluntarily. It has occurred to me to try to produce an artificial incoherence in "speechless" patients by partial chloroform narcosis. M. Baillarger quotes from Gratiolet a statement to the effect that the frontal convolutions on the left side are in advance of those on the right in their development. Hence, if this be so, the left side of the brain is sooner ready for learning. It is the elder brother.

At first glance there seems to be an utter difference betwixt a smile and such an ejaculation as an oath, and a greater still betwixt a smile and such a sentence as "How is Alice getting on?"[1] There may seem to be an equally great difference betwixt ataxy of articulation and uttering wrong names for things. I have already, in some remarks on a case of chorea, referred to this subject (*Medical Times and Gazette*, January 28, 1865). "It is, in some classes of cases of disease of the nervous system, hard to say where obviously motor symptoms end and where the purely mental ones begin. Thus there is (in cases of hemiplegia on the right side) every gradation betwixt, on the one hand, a total loss of power to express ideas, or a loss of knowledge of the relation of words to things, and, on the other, apparently scarcely more than an ataxy of articulation. And sometimes in the same case we find that the patient makes mistakes in words, and also articulates badly." It is not difficult to show that ataxy of articulation and so-called loss of memory for words are really defects of the same kind, and that the loss of the sign the speechless patient had for a thing is the loss of power to reproduce in his organs (in health from his brain, through series of centres, to the end of his tongue), the *movements* he has learned for that sign, or, at least, the "motor impulse," and that damage near the corpus striatum affects language and thought, not because any so-called faculty resides there (or anywhere, except in the whole brain or whole body), but because more or less of parts which help in making symbols are broken up. The fact that people do not put their tongues in motion when they think may seem to be a great difficulty; but I hope to show that it is not so great a one as is imagined. This will be but a particular expansion of the views which Bain has long taught, and which, indeed, he has applied to speech. "When we recall," he says, "the impression of a word or a sentence, if we do not speak it out, we

[1] I would here refer the reader to Mr. Herbert Spencer's "Principles of Psychology," and especially to the chapters "The Growth of Intelligence," "Reflex Action," "Instinct," and "Memory." The facts related in this paper seem to me to be in harmony with certain views Mr. Spencer has put forward in those chapters.

feel the twitter of the organs just about to come to that point. The articulatory parts—the larynx, the tongue, the lips—are all sensibly excited; a *suppressed articulation* is, in fact, the material of our recollection, the intellectual manifestation, the *idea* of speech." The italics are in the original.

M. Broca makes the following remarks, which amount, in principle, nearly to the same thing, in a pamphlet he was good enough to send me a year or two ago. (Extrait des Bulletins de la Société Anatomique, juillet, 1863.) "Pour expliquer comment un aphémique comprend de langage parlé, sans pouvoir cependant répéter les mots qu'il vient d'entendre, on pourrait dire qu'il a perdu, non la mémoire des mots, *mais la mémoire des moyens de co-ordination que l'on emploie pour articuler les mots.*" The use of the word memory in the sense of its being a distinct faculty is, I think, likely to lead to some confusion. Spencer says, ". . . such a succession of states (*motor impulses*, the results of conflicting impressions) constitutes *remembrance* of the various motor changes which thus become incipient—constitutes a *memory*" . . . "Thus then the nascent nervous excitements that arise during this conflict of tendencies are really so many *ideas* of the motor changes which, if stronger, would cause a *recollection* of such changes, and thus memory necessarily comes into existence whenever automatic action is imperfect." According to this definition, memory is the obtruding of some of the motor impulses on the consciousness, but I suppose M. Broca means by memory of words the connexion the seats of motor impulses (co-ordinating centres, or whatever they may be called) for words have with that other part of the nervous system (whatever and wherever it may be) which set them a-going.

Dr. Fournié has also written admirably on this subject, and indeed on the whole question of language. I follow him in principle, although I differ from him in some details, which, however, I daresay he may not think to be details. I must, however, leave this part of the subject for the present, and take it up from the point of the relation of sensation to motion, and of each of these to centres.

That the convolutions near the corpus striatum have to do with guiding muscles in articulation, there can, I think, be little doubt, and we may make the subject of study wider by inquiring (which I think we may do in the case of chorea) if they are not for corresponding actions—not mere movement—of the muscles of the limbs as well. That the corpus striatum is the centre chiefly for the limbs, as apart from the trunk, pathology, I think, leaves no doubt. In this connexion

it is important to mention that Laura Bridgman, when she dreamed, "talked" in finger language, and doubtless she thought by signs she made with her fingers (and their brain connexions). As we generally think in the movements of our articulatory organs, or in the motor impulses, to move them, so she "talked" and thought in the way she was taught.

Dr. William Thomson, the present Archbishop of York, writes ("An Outline of the Necessary Laws of Thought"): "Those among the deaf and dumb who have been taught by the pains of an enlightened humanity to converse and to think must use, instead of the remembered words which we employ, the remembered images of hands in the various combinations of finger-speech (here the italics are mine) *as the symbols of their thoughts*. The deaf and blind, taught the names of objects from raised letters, must think, not by associations of sound, but by touch."

Of course, we do not either speak or think in words or signs only, but in words or signs referring to one another in a particular manner, any more than we move single muscles, or muscles co-ordinated to a particular end. Indeed, words in sentences lose their individual meaning—if single words can be strictly said to have any meaning—and the whole sentence becomes a unit, not a word-heap.

Dogberry thought such things as reading and writing come by nature, but we now believe that even the easy flow of talk of the most loquacious is essentially an entirely artificial process, and that even (granting there is truth in the pooh-pooh! and bow-wow theories) the origin of signs—i.e., words—had little in it that was like anything instinctive. The Archbishop of York says, "In the fullest sense, language is a divine gift, but the power and not the results of its exercise, the germ and not the tree, was imparted." I am quite aware that written words and finger words are said to be signs of signs, but they belong to the same category as language does, in that writing is an artificial process, and distinct, at least in degree, from such actions as smiling, respiration, and gesticulations.

I think it will be found that the nearer the disease is to the corpus striatum, the more likely is the defect of articulation to be the striking thing, and the farther off, the more likely is it to be one of mistakes of words. This is not contradictory to what I have elsewhere said [1] as to the degree of difficulty in expression depending on the *quantity* of brain damaged "about the highest part of the motor tract, the corpus striatum—the point of emission of the orders of

the 'will' to the muscles." I think, too (although I have yet but little evidence on the point), that in cases of embolism of branches of the middle cerebral artery, we shall find the difficulty to be in "finding" the right word (i.e., in making the right signs) rather than in the process of manufacturing the signs, and for this reason that convolutions at a distance are more likely to be damaged, and, again, that the damage is widespread, and often slighter in degree. Finally, I think we have good grounds for investigating if the arterial supply is not so *developed* as to *re*-unite in *actions* parts which have been differently cultivated in *function*. What Professor Bain calls an emotional wave, I think of under the fancy of an arterial wave. I think the occurrence of a particular action is probably due to the local stoppage in this wave. I think so because there is, I believe, evidence to show that subjective movements and sensations in disease are due to local debility of nerve tissue, as Radcliffe has long taught. Moreover, we may, I think, on Radcliffe's hypothesis, at least more easily, explain periodicity and intermissions in such diseases as chorea, epilepsy, ague, &c.

The vascularity of the region of the corpus striatum is, I think, a fact of much significance in the wider study of the relations of nutritive life and functional activity. The subjective sensation of smell of colour, &c. (the so-called aura in some epileptiform attacks), I liken to a sort of involuntary memory of past impressions, and the spasm of the muscles of the hand—the so-called aura or partial fit—which occurs in some patients who are liable to unilateral epileptiform seizures to one of motor impulses. The subjective sensations of disease differ, however, from the rememberings of health and the contending actions of the whole of the muscles of the hand—the extensors striving with flexors, and the stronger getting most of their way—differ from particular purposive movements. In disease it is as if a row of keys were struck down together in mere order of continuity, producing not music, but noise; whilst the revived sensations and motions (or motor impulses) of health are like chords formed of a few notes related in harmony. That there must be some process by which one part of the nervous system arouses in the nervous systems of sense and in the various motor apparatus past impressions, there can, I think, be little doubt, and I would suggest that one link in the mechanism of this process may be the contraction of muscular-coated vessels supplied by ganglionic nerves; or, more generally, that within certain limits life and function are in an inverse ratio. Of one thing I feel pretty

confident, that disordered function in some epileptiform seizures occurs in parts of the brain which lie in arterial regions, and I have little doubt that clinical evidence points to Radcliffe's conclusion that the part of the nervous system related to muscles convulsed in epileptiform attacks is, from some cause or other, below par. In the subjective sensations called *phosphenes*, produced by pressure on the globe of the eye, there is, I think, demonstrable evidence that there is less blood in the retina as firmer pressure makes the optic disc bloodless. Yet I do not wish to argue much from this fact at present, as I have no certainty that the part pressed on is more anæmic than the rest of the retina.

From this point let me again urge students, who wish to make cases things to think from, to avoid the too free use of technicalities and to study one case by the light of many. It is, I think, important to study chorea and epilepsy in reference to speech as well as to study cases of what may be called pure aphasia or aphemia.

ON THE PHYSIOLOGY OF LANGUAGE.

[*Medical Times and Gazette*, September 5, 1868, vol. ii, p. 275.]

DR. JACKSON treated his subject under the following heads :—

TWO KINDS OF LANGUAGE.

Healthy language is of two inseparable yet distinct forms :—

(1) Intellectual, i.e., the power to convey propositions.

(2) Emotional, i.e., the ability to exhibit states of feeling.

The two are separated by disease. It is intellectual language alone which suffers in most of the cases to be described. Emotional language usually escapes altogether.

Intellectual language suffers *throughout*, not only in its most striking manifestation in (*a*) words, but in (*b*) writing, and (*c*) sign-making.

It is the power of intellectual expression by "movements" of any kind which is impaired, those most special, as of speech, suffering most; those of simple sign-making least, or not at all.

Emotional language is conserved *throughout*, not only in its most striking manifestation by (*a*) variations of voice, but in (*b*) smiles, &c., and in its most simple manifestation by (*c*) gesticulation.

Although thus circumscribed by the term "defects of intellectual language," there are within this limit many varieties of defects produced by disease near the corpus striatum. The author never uses the terms "aphasia," "aphemia," &c.

It is easiest to say what they are *not*.

(1) *They are not defects of voice.*

(2) *They are not defects due to mere paralysis of the tongue and other articulatory muscles.*

(3) *They are not owing to any fault in the outward organs of reception.*

The Special Nature of the Defects of Intellectual Language.

The author arranges the cases he has to mention, for convenience of exposition, in two classes. In the first class the author supposes

that the sensori-motor processes for speech are more or less *destroyed*; in the second that they are *unstable* from under-nutrition (see [8]).

Class I.—Severe cases *in which the patient is speechless or nearly so, or in which speech is very much damaged.* In the worst of these cases the patient can only utter some one unvarying word or two words, or some jargon.

Class II.—Cases in which there are plentiful movements, but wrong movements, or *plenty of words, but mistakes in words.*

Under Class II, he points out that taking the phenomena of many cases we find evidences of damage to sensori-motor processes, higher or lower in evolution, according to (*a*) complexity of movements; (*b*) width of interrelation; (*c*) number of associations, from ataxy of the grosser movements of articulation to an "ataxy" of movements embodying ideas.

He then considers very generally, and with regard to all varieties of cases, the defects in complementary modes of intercommunication which accompany defects of speech, and takes the opportunity of considering a question asked, *What is the degree of intelligence these patients have?* He expressly guards himself against any implication that language and thought exist separately. The question is not, How is general mind damaged? but, What aspect of mind is damaged?

He considers the mental condition of patients in Classes I and II as regards:—

(*a*) *Sign-making* is least affected, sometimes seeming to escape altogether. He urges that we should distinguish in degree betwixt power to make simple signs which idiots can make, and the elaborate signs—saying nothing of finger language—which people make who are healthy, except for congenital deafness, and that we should observe if the patients can make signs to signify abstract quality as "blackness."

(*b*) *Writing.*—This suffers more or less in nearly every case of defect of speech from disease of the hemisphere, but varies as much as the defect of speech itself does.

Indeed, writing, and we may add reading, is the same defect in another form. For in each we have to reproduce the motor symbols of the words. Written or printed symbols are "symbols of symbols."

The patient who cannot write can usually *copy* writing correctly.

Patients can often sign their own names without copy when they cannot or will not write anything else.

(*c*) Do the patients know what is said to them? It is usually held that "aphasic persons" do. The author thinks they usually do when they are speechless except for some unvarying jargon, i.e., cases in Class I, but that when—cases in Class II—they have free but disorderly utterance so high as mistakes in words they often do not understand, i.e., quickly understand, words said to them.

(*d*) Can the patients repeat words said to them? They cannot in Class I; in Class II they can, with or without blunders.

The author supposes the reason in (*c*) and (*d*) to be:—

That in Class I, the sensori-motor arrangements for speech are *destroyed* in their *lowest* processes by *limited* disease near to, and involving, the corpus striatum. The sensory aspect of the sensori-motor processes of mind is not reached. It is the "way out" which is broken up.

That in Class II, the sensori-motor processes are impaired, but not destroyed, and that the change is not limited to the region of the corpus striatum, but reaches deeper in the brain.

(*e*) They cannot read, but they can—often at least—understand what is read to them.

(*f*) and (*g*) These points are very cursorily considered.[1]

Educated Movements.

The movements of speech are educated movements, and thus differ widely from those movements which may be said to be nearly perfect at birth, such as those for respiration, smiling, swallowing, &c. All the muscles represented in the corpus striatum unilaterally[2] require a long education, and the most special of these are those engaged in the movements of speech, and next those of the arm. The muscles always acting bilaterally, and chiefly represented bilaterally in the corpora striata, are born with their centres for movements nearly perfect. Thus, then, the term "Intellectual Language" merges in the larger term "Special Movements acquired by the Individual," and the term "Emotional Language" in the term "Inherited Movements" (common to the Race). There is a still more fundamental distinction.

[1] There is nothing to show what these points were.—[EDITOR.]

[2] It is true that the tongue acts bilaterally, and that it is represented on both sides of the brain. But still it differs from other muscles acting bilaterally, in that each of its sides has a distinct representation in its corresponding (opposite) side of the brain. (See Broadbent's paper, *Med. Chir. Rev.*, April, 1866, p. 479.)

The most General Nature of the Defects.

The author first considers Class I. Here the words previously used give way to terms larger still. In its highest or worst form it is a loss of *voluntary* power with conservation of involuntary capability.

(*a*) The author first illustrates by the case of gross movements—e.g., a speechless patient may be unable to put his tongue out, although it moves well in reflex, &c., processes.

He next shows that there is a corresponding difference even in quasi-mental movements. "Speechless" patients sometimes ejaculate involuntarily.

(*b*) It will be found that some of those patients who cannot talk voluntarily can swear. They utter other ejaculations which are of the same category—meaningless for the expression of ideas about things, although useful as vehicles for the exhibition of feeling. They swear or ejaculate when excited, *and cannot repeat the words of the interjectional utterances when they try.*

(*c*) Next he instances ejaculations more appropriate to the circumstances under which they are uttered, and which are a step higher in speciality.

(*d*) Next, and highest, a man usually utterly speechless may get out an actual proposition.

Here, again, taking into consideration the phenomena of many cases, it will be seen that there is, so to speak, an ascent in "compound degree" from utterances, like the common explosive oath, most *generally* related to *general* external circumstances, to actual propositions *specially* related to *special* external circumstances — i.e., until the difference betwixt voluntary and involuntary utterance is lost.

The above-mentioned series of phenomena show, the author *thinks, that there are in "speechless" patients sensori-motor processes for words somewhere, though usually the "will" cannot get at them.*

This somewhere can scarcely be on the *left* side of the brain, for damage of this side has made the man speechless. These involuntary utterances are, the author supposes, the result of action of the *right* side. In other words, he thinks that the left is the leading side, and the right the automatic.

The Will.

He then tried to show the relation of the so-called "will" to the rest of sensori-motor processes, and this time takes his illustrations from the stock words or phrases which the patients always use. First, he

points out that it is probable that the stock phrase was the leading sensori-motor process when the brain was suddenly damaged, and speaks of two cases in illustration. A man becomes speechless after hard work at *making a catalogue*, and can afterwards say only "List complete." (Recorded by Dr. Russell, of Birmingham.) Another man receives a wound in the left hemisphere *in a brawl*, and can only say, "I want protection."

He then speaks of Spencer's views on the "will" and, as he believes in accordance with those views, calls the "will" the *leading* sensori-motor process of the moment, there being no such separation as Will *and* Mind.

The Left Side of the Brain the Leading Side, the Right the Automatic.

The author does not think, as Dr. Moxon does (see *Medico-Chirurgical Review*, April, 1866), that the left side of the brain only is educated, but that both are educated. It is certain that damage to the right side of the brain produces no defect of speech in most cases, and equally certain, the author thinks, that the *disease of the left side only cannot prevent the patient getting out words when a forcible circumstance outside himself is in very special relation with the processes for those words.* For he points out that although there is in cases of involuntary ejaculation no prompting by the "will of the patient," so to speak, the occasional utterances are developed with more or less appropriateness to the external circumstances.

Although the cerebral hemispheres are twins, the left may, if we accept Gratiolet's statement, be said to be the first born. It is born with the lead, and thus a patient who has damage to the left side of his brain cannot *initiate* movements in the undamaged right side, either objectively, as in talking, or subjectively as in reading.

The author has recorded a case of loss of intellectual language in a patient who was *left-handed*, but states that in other cases this explanation will not apply, and he admits that there are cases of defect of intellectual expression with *left* hemiplegia which cannot be explained. Some of the patients, however, have been previously paralysed on the right side, although perhaps without any accompanying defect of speech. Still he has never seen a case of disease of the right hemisphere, only as proved *post mortem*, with defect of speech of any kind, but has recorded three cases in which this side

of the brain (including Broca's convolution) was diseased without defect of speech. And all are agreed that when hemiplegia occurs with loss of speech, the hemiplegia is *nearly always* of the right side. He has, however, received reports of two cases, one recorded by Dr. Long Fox, of Bristol, and one by Dr. Pye Smith, in which the Broca's region (on the left) was diseased without loss of speech.

Localization.

The author's views on *Localization* have been already so fully given by himself that it is needless to repeat them. In the last (the fourth) volume of the *London Hospital Reports* the author has reported several autopsies on patients who died aphasic.

NOTES ON THE PHYSIOLOGY AND PATHOLOGY OF THE NERVOUS SYSTEM.

[*Medical Times and Gazette*, November 7, 1868, vol. ii, p. 526.

Language and Thought—the Duality of Mental Processes.

I suggested in my last article ("Hemispherical Co-ordination," *Medical Times and Gazette*, September 26, p. 358), of which the present is a continuation, that the pair Expression and Perception are really two pairs—(1) Involuntary and (2) Voluntary Expression, and (1) Involuntary and (2) Voluntary Perception.[1] I was led to this supposition by a consideration of the phenomena of some cases of speechlessness the result of damage to one (usually the left) side of the brain, or, as I would put it, of the cases of persons who cannot revive words *voluntarily*. What follows is mostly an amplification of the concluding paragraph of the preceding article, and an attempt (see the part on representative perceptive signs) to make clearer what I have spoken of crudely as a double revival of "images," "concepts," &c.

I ought, in fairness, to state beforehand that most of what follows is speculative. The justification of the speculations lies, I imagine, in their leading to a more orderly method of investigating the revelations which cases of disease of the nervous system are constantly making. It is obvious that much of what follows is accepted doctrine, and the only point I wish myself to urge is the *doubleness* of mental processes.

[1] It is needful to say how the term "perception" is to be understood in this article. *The psychical, like the physical, processes* of the nervous system can only be *functions of complex combinations of motor and sensory nerves*. I have in the former paper guarded myself against being understood to imply that sensation and movement exist separately, although, for simplicity, I speak of them as separate. Moreover, it is not implied that Sensation and Perception are altogether different. A Perception is a complex and yet an orderly development of impressions chiefly received in the past from *many different* sense surfaces; and when I speak of a sensation arousing a perception involuntarily I simply mean that, for instance, a noise or a touch may at any time make *actual* in the higher parts of the central nervous system (and their peripheral connexions) a *unit*, which is at all times potential, formed out of *many* impressions. It is as if, to use a very crude and inadequate illustration, the sound of one letter were to develop, not an auditory image of itself or several repetitions of itself, but the sound of a whole word made up of different letters, of which word the one letter is perhaps the first letter. In perception (as the term is to be used in this paper) several sensations, simple or complex, or both, have yielded, so to

I would especially refer to the writings of Laycock, Spencer, Carpenter, and Lockhart Clarke.

Words serve not only in speech but in thought; in the former they are usually actually uttered; in the latter the processes for them are only nascently excited. But I think it is not sufficiently exact to speak of thought as "internal speech."

It is not enough to say that speech consists of words. It consists of words *referring to another in a particular manner;* and without a proper interrelation of its parts a verbal utterance would be a mere succession of names embodying no proposition. A proposition—e.g., gold is yellow—consists of two names, each of which, by conventional contrivances of position, &c. (called grammatical structure in well-developed languages), modifies the meaning of the other.[1] All the names in a random succession of words may, it is true, one after the other, excite perceptions in us, but not perceptions in any relation to one another deserving the name of thought. The several perceptions so revived do not make a unit. We are *told* nothing by a mere sequence of names, although our organization is stirred up by each of them. Now, a proposition is not—that is to say, in its effect on us—a *mere* sequence.

When we apprehend a proposition, *a relation between two things* is *given* to us—is for the moment, indeed, forced upon us by the conventional tricks which put the two names in the respective relations of

speak, their own personality into the formation of a higher unit which we then distinguish as a perception.

Similarly in expression, the corresponding opposite of Perception, we find in a certain disorder of articulation (from disease of the higher parts of the nervous system, e.g., of the region of the left corpus striatum) that the defect is not of the muscles of the palate alone, nor of those of the tongue alone, &c., nor of all of these *grouped* together. It is a disorder of a complex unit for the whole process of articulation. But I must defer the more complete consideration of these points until I come to treat of "Spectral Illusions," which are, I conceive, the sensory correlatives of those complex motor disorders which border on, or constitute, incoherent talk.

I adopt the expression "thread of consciousness" for those of our always possible sensori-motor processes, which are for the time *actual* and into which sensations or perceptions are continually bringing modifications.

I may here say something on the use of the words "will," "voluntary," &c. Although we "will," in the sense that we do what we like, provided there are no external hindrances, we do not desire as we like (see Spencer on the "Will," "Principles of Psychology," Lockhart Clarke on "Volition." *Psychological Journal*, Nos. 8, 9 and 10). I must use some such word, and I use the words "will," &c., pretty much as "effort," reflection," &c., are used.

[1] The remarks of Waitz, from whom I have borrowed the idea in the above paragraph, are of very great interest in this connexion. The passages are too long for quotation. (See Waitz's "Anthropology," translated by Collingwood, p. 241 *et seq.*).

subject and predicate. We receive in a *twofold* manner, not the words only, but the order of words also.

Within the speaker's mind the complete process must correspond to this double gift. I remarked in the article above mentioned, "there is [internally] something like a reduction of [apparent] relations of sequence to relations of co-existence (i.e., alternate sequence) in the *two* terms of a proposition." His uttered sentence is the result, I conceive, of a double succession of movements (words). There is, I imagine (when we take into consideration what we may suppose to be the full process which ends in the actual utterance), a corresponding double succession of perceptions, too. I tried to show that in the process which leads to outward speech —not necessarily outward, of course, let us say, to propositions—there is a double revival of words—automatic revival—prior to voluntary revival; and that the *automatic* revival occurs first, and on the *right*, and the voluntary revival afterwards on the *left*, side of the brain. Concepts, images, perceptions, or whatever they may be called—I shall use the word "perception" in this paper—develop words automatically in no order, or rather in their own order, on the right side of the brain. Words are, or may be, objectively considered on the left, put into new relations, made into propositions. I wish to speak of the links *between* these two revivals. The links are, I imagine, the perceptions of which the words are the arbitrary signs. I wish also to speak of the links between the revived perceptions. They are the aforesaid revived movements of words. In fact there is, I conceive, an alternate play between the higher "movements" and "sensations" of mind, as there is in the commoner movements and sensations of the body. In the latter, after a sensation has excited a movement, the presumption is that the sensory nerves from the muscles put in action, or perhaps from the skin over them, register the form and degree of the *movement made or making*, and no doubt in such automatic processes as walking these supervising nerves serve also in the excitation of the movement which is to follow in adaptation to the common purpose of the series of movements—helps to determine *its* form and degree. In walking there is no difference, or no obvious difference, in the alternating movements, but in the leading parts of the nervous system the processes are not altogether automatic. If they were there would scarcely be a consciousness.

It is convenient to speak first of the two revivals of perceptions, and next of revivals of words, although, as already said, I conceive the revivals to be *alternate*—involuntary motor, involuntary perceptive: voluntary motor, voluntary perceptive.

It seems plain that there is, at least often—always, I imagine—involuntary prior to voluntary[1] revival of perceptions. To take an instance. When I hear a certain creaking noise, I "see," in spite of myself, a certain room. I should have so *suffered* any time the last twenty years, and may for the next twenty. Here a simple sensation rouses a perception. The creaking sound is merely a particular noise affecting the auditory nerve; but the induced change in this nerve necessarily revives in the brain to which it travels impressions of other things with which, in co-existence or in sequence, it had been often formerly received. Probably the noise always acts on me in essentially the same way, but in very different degrees. When I am thinking of something important, there is either no obtrusion or the *faintest*, or perhaps I should say only the most *temporary*, obtrusion of the awakened perception on the "thread of my conciousness." But were I not strongly pre-occupied or granting that certain circumstances, say the recent death of a friend whom I used often to meet in that room, were *en rapport*, it would take the lead in my mind. I should "will" to dwell on the perception which has been obtruded on me, and for this there would, I presume, be required a *voluntary* revival of the perception—objective consideration—and this second revival would occur, as I speculate, on the right side of my brain. In short, the sensation first acts upon me as it finds me, unawares. I am suddenly its victim, for it brings the room before me in spite of me. The awakened perception may or may not quickly fade out of my consciousness, or it may be revived by effort when the noise has ceased and is perhaps forgotten. Moreover, it must take a place in, so to speak, any "proposition of perceptions" I like to put it in. Or using popular language, I can reflect on it.

To repeat, there is first involuntary revival of perception, afterwards there is or may be voluntary revival. And of the voluntary revival it must be added that the perception, besides being modified, is or may be put in a new order with others. Indeed, it is necessarily modified by being put in a new order, as words are in a proposition. But what is the intermediation betwixt these two different perceptions? They are really different, each being not merely a repetition of the other. It is movement, i.e., the movement of words.

[1] Although I must speak for convenience of the two sides as being respectively voluntary and involuntary, I do not think there is any abrupt difference. The remark in the text implies the belief that there are all degrees betwixt automatic action and that kind of imperfect action which is the dawn of "will."

Let us see how the hypothesis applies to what follows hearing the word "horse" in a proposition. Horse (the real thing, that is) cannot be considered objectively in the same sense as the room can. Nevertheless, when the word "horse" is said to me I do properly understand what is meant, and I understand sentences of which the word "horse" forms a part, as "horse is swift." The word cannot, it may be urged, revive the perception of anything automatically, as it is not the name of any one thing—of any particular horse. It serves as a sign for all horses, for horses of different colours, for young horses, for old ones, for fat or for lean ones. Still, it revives something. There have long been permanent modifications of my brain which make it possible for another person at any time to *compel me* to have in my consciousness, at least momentarily, unless I am strongly preoccupied, *some* kind of notion of horse. He excites certain changes in the "grooves" of those permanent modifications of my brain which are always with me, part of me. And although what the speaker can bring about directly is only a certain series of vibrations on my auditory nerves, these vibrations are of necessity, in all Englishmen who have seen horses, followed by a notion of "horse." What is the nature of this ever-present modification of my organization, usually sleeping, but any time to be awakened by the noise "horse," to give me a notion of horse? Is it a sensory, or is it a motor process? In other words, is it a potential, i.e., a unit formed out of certain complex sensations, having a *direct* relation to horse, woven from former seeings of more than one horse—or is it an arbitrary (potential) motor sign in itself altogether meaningless—a counter which is revived to serve in thought *instead* of a perception (a spectre) of horse? I think there must be both a motor and sensory process.

It is plain that I have always in my brain a motor sign for horse, for I can say the word "horse" at any time, and no doubt, when I hear the word "horse," the motor process—the word—is the one first revived in my mind by the aural sensation. Its revival is, fundamentally considered, an instance of a particular movement blindly following, by acquired habit, a particular sensation. This motor sign is, or may be, developed *automatically* on the right side of the brain, for it is possible to rouse it in a man who has lost the side of *voluntary* revival of words by disease.[1] But have I not something more in my

[1] To take an old illustration—the word "triangle." How, it may be asked, can this motor sign in a proposition develop in us the perception of a triangle, of whose shape nothing special is affirmed, when actual triangles are dissimilar—equilateral, isosceles, and

mind than the mere *motor* sign when I understand a proposition with the word "horse" in it?

There must, I conceive, be besides a sensory image of some kind—a perception. Moreover, there is, I speculate, a double revival of perceptions in understanding a proposition with "horse" in it.

The first thing in this double process of perception, I presume, is that the automatic motor sign "horse" acts on the left side of my brain as the creaking sound did, and develops that *perception with which it is arbitrarily associated.* [The creak has a direct relation with the perception "room." The noise "horse" has an indirect relation with this arbitrary sensory image horse, through the word "horse."] So far the process is still involuntary. We must stay here to consider what the nature of the revived involuntary perception is.

In the case of the creak the perception of one *particular room is revived*, not a "general notion" of rooms. The creak is, then, so to speak, that one room's proper name. But in the case of horse, there being no particular horse in question, what is the nature of the perception revived?

My notion is that we not only think by help of arbitrary *motor* signs (words), but by help of arbitrary perceptive signs, and that we have permanently in our brain organized forms of the latter, just as we have organized forms for the former—movements of words. I will try to illustrate this, saying, however, beforehand, that the illustrations are scarcely parallel to the case of "horse"—at least, not seemingly so.

When I am to think of a place I have once visited, I "see" faintly some part of it which has struck me most, e.g., of Petersfield, the market-place: or of a certain village, the Green, where there are railings under an elm tree. Such fragments stand to me, I conceive, as counters in ordinary thought for the whole place. If I am made to think of a place I have never seen, but have read of, I have still some visions of maps or of names on maps. These perceptive signs are really

scalene? It is hard to analyse one's thoughts on such a matter, but I feel that I myself have a perception of a particular triangle—viz., an equilateral triangle, which, I suppose, serves automatically, in thought, for what I may call my general notion of a triangle. Suppose the following proposition is in question: "The three interior angles of every triangle are equal to two right angles." I cannot but think that everyone who heard and understood this statement would have a perception of a drawing of that kind of triangle which had, in his experience, been most frequently associated with the word "triangle," or some one triangular figure which had struck him. Suppose the above statement is repeated in detail. "This is true of the equilateral, the isosceles, and the scalene triangles." There would then be developed with each name perceptions of each kind of triangle—with three equal, with two equal, and with three unequal sides.

sensory sign for it, which is really quite arbitrary. Thus, when I think of Berlin, or of America, all I can put before me for these places are quite as arbitrary signs as words are, although each person has his own perceptive signs. It would seem as if anything of the sort would do, for when I think of New York I "see" a picture I once looked at of Broadway. When I read of scenes in "Arctic Voyages," I think of vast hills of ice and water.

Now, I can in each of the above cases, according to the degree of my direct or indirect knowledge of the place or scene, enlarge the simple sign or alter it, or perhaps translate it into some other preception which the circumstances may require. When I have seen Berlin, I shall have a different perception of it; and even now I can at will think of it as an assemblage of houses with streets, shops, public buildings, &c. There is automatic revival followed by voluntary revival—the latter revival being essentially an adoption of the obtruded perception by my consciousness—i.e., putting it in new relations by which it is necessarily modified.

The above-mentioned perceptive signs for single objects are analogous to proper names, and it does not follow that I have an arbitrary perceptive sign for horse, in a proposition referring to no particular horse. It is next to impossible to analyse one's thoughts on such a point, but my impression is that we have ever present in the nervous system an organized form which, when revived, is a shadowy vision of some horse—perhaps of one particular horse with whose shape, &c., we were struck—and this serves with the word horse for "horse" automatically in rapid thought. It is possible—this is the belief of some, at least—that the word "horse" was at the earliest part of our intellectual life the *proper* name of some one horse, the one, possibly, we first saw. The very same word afterwards becomes the sign of our "general notion" of horse. There is some analogy in the sensory part of the mind; for as regards the room, so often mentioned above, its particular perception very often stands to me for rooms in general, and it is a revived image of this very room that I have mostly "in my mind's eye" when I read of domestic life, and I place the characters of tales in it. It has become to me the analogue of a general name.

I can at any time voluntarily "see" a horse. I can "see" a white one, a black one, a fat one, a lean one. But in rapid thought I see no particular horse, for no one is spoken of. I have only my "lay figure" of a horse. I can translate my single permanent perception of horse into the perception of any particular horse I remember.

ABSTRACT OF THE GOULSTONIAN LECTURES ON CERTAIN POINTS IN THE STUDY AND CLASSIFICATION OF DISEASES OF THE NERVOUS SYSTEM.

Delivered at the Royal College of Physicians.

[*The Lancet*, March 6, 1869, vol. i, p. 344.]

LECTURE II.

CONTINUING the subject of the Medical Physiology of the Cerebral Hemisphere, the lecturer gave a condensed account of some of the innumerable varieties of defects of speech which attend diseaes of, and of the hemisphere near to, the corpus striatum on one side, usually the left. He thought, with regard to the patient's mental condition, it was, above all, most important to bear in mind the lapse of time from the seizure, and mentioned cases in illustration. He related cases of *temporary* loss of speech presumably from embolism, in which cases, as in those of permanent loss of speech, there was an inability to write as well as to speak. He thought that specimens of writing from patients so suffering were much needed. In some cases of temporary loss of speech occurring with unilateral spasm the patient could write. He spoke of children speechless from birth, and alluded to the bearing of these cases on the important hypothesis put forward independently, and almost contemporaneously, by Broca and Moxon. He tried to show that defects of speech should be classified on the same fundamental principle as grossly motor defects—into those implying destruction and into those implying instability of nervous tissue; or, in other words, into those in which there is diminution of power to speak, and those in which the defect is disorder of speech—e.g., mistakes in words. He believes the mental condition is different in the two classes of cases.

With a view to support stili further the doctrine of localization he holds, he tried to show from the phenomena of some cases of hemispasm (occurring with disease of one cerebral hemisphere), that there is an order of frequency in the parts in which the spasm commences, and pointed out that there is also a "compound sequence"

in the march of the spasm. He insisted on the necessity of recording what is seen to take place in the simplest cases of convulsion, and hoped that from analysing the "compound sequences" in these cases, we may learn something of the internal relations given to muscular regions which externally are widely separated. He pointed out that the phenomena of hemispasm show that muscles acting bilaterally are practically *equally* connected with each of the corpora striata—a conclusion which Dr. Broadbent had some years ago arrived at deductively. The phenomena of the severest cases of hemispasm from disease of one hemisphere, however, in which both sides of the body are convulsed, led him to a modification of Broadbent's hypothesis. Thus, taking one side of the brain, the right, the lecturer thinks the muscles acting unilaterally, both of the left and of the right side of the body, are represented in the right side of the brain, but that the muscles of the left side of the body are especially represented there: Firstly, more in quantity, for they are more affected when the hemisphere discharges; secondly, first in time (instability), for they are affected before those of the right side. He thinks that, having, from the study of the effects of want of action and of "over-action" of the corpus striatum, arrived at a better knowledge of the plan of composition of one nervous organ, we may fairly use this knowledge as a means of further investigation. He thinks that Broadbent's hypothesis, and the facts which so strikingly confirm it, help us to a better understanding of the action of *two* hemispheres in mental processes. From a consideration of the phenomena of such cases as that of a man (the left side of whose brain was damaged) who could not speak, but could understand what was said to him, who could not write, but could copy writing, and who might ejaculate—from the consideration of such a case, the lecturer was led to believe that the fundamental defect in loss of speech from disease in one hemisphere is inability to reproduce words voluntarily, because the leading motor part of one (the left) side of the brain is damaged. Involuntary reproduction (understanding words) remains possible, because the automatic side (right) is intact. Thus, reduced to its simplest form, loss of speech corresponds to hemiplegia, in which form of palsy the voluntary movements are lost, the involuntary preserved. In other words, it seems that the "unit of action" of the nervous system is—as we might expect from the organism being a two-sided one—double the unit of composition. There is, however, a difference betwixt damage to the corpus striatum and damage to the hemisphere just above it, viz., that whilst damage

to *either* of the corpora striata produces, practically, the same effect, viz., loss of the most voluntary movements of the limbs on but *one* side of the body, damage to *but one side* of the brain—usually the left—will destroy voluntary speech altogether. This, however, is not the objection it, at first glance, appears to be; for in the highest sensori-motor processes we cannot expect that there will be *two* sides for the "cessation of automatic action and the dawn of volition," which is, Spencer says, one and the same thing. The two brains cannot be *mere* duplicates if damage to one only will make a man speechless. For those processes, than which there are none higher, there must surely be *one* side which is leading. The lecturer supposes that the processes for judging distance, for walking, for talking, and for thinking, are fundamentally alike, and that unless the patient who is rendered speechless by damage to one motor side of his brain had (in addition to right and left sensory regions) processes for the subjective movements of words remaining, he would not be able to *understand* a proposition, i.e., he would not be able to give relations of co-existence (co-existence is, according to Spencer, alternate sequence) to images developed by its two terms, which terms are presented to him in a *simple sequence*, any more than he can, without movement, estimate the *relations* of *two* external objects by impressions on two sense surfaces.

ON THE ANATOMICAL AND PHYSIOLOGICAL LOCALIZATION OF MOVEMENTS IN THE BRAIN.

[*The Lancet*, January 18, 1873, vol. i, p. 84.]

For some years I have studied cases of disease of the brain, not only for directly clinical, but for anatomical and physiological purposes. Cases of paralysis and convulsion may be looked upon as the results of experiments made by disease on particular parts of the nervous system of man. The study of palsies and convulsions from this point of view is the study of the effects of "destroying lesions," and of the effects of "discharging lesions."

And for an exact knowledge of the particular movements most represented in particular centres we must observe and compare the effects of each kind of lesion. It is just what the physiologist does in experimenting on animals to ascertain the exact distribution of a nerve, he destroys it, and also stimulates it. Indeed, this double kind of study is essential in the investigation of cases of nervous disease for physiological purposes. For limited *destroying lesions of some* parts of the cerebral hemisphere produce no obvious symptoms, whilst discharging lesions of those parts produce very striking symptoms. By this double method we shall, I think, not only discover the particular parts of the nervous system where certain groups of movements are most represented (anatomical localization), but what is of equal importance, we shall also learn the order of action (physiological localization) in which those movements are therein represented.

I begin by speaking of destroying lesions, and take the simplest case—hemiplegia of the common form from lesion of the corpus striatum. A blood-clot which has destroyed part of the corpus striatum has made an experiment, which reveals to us that movements of the face, tongue, arm, and leg are represented in that centre. This is the localization of the movements anatomically stated. Physiologically, we say that the patient whose face, tongue, arm and leg are paralysed, has lost the most voluntary movements of one side of his body, and it is equally important to keep in mind that he has not lost the more automatic movements. The study of cases of hemiplegia shows that from disease of the corpus

striatum those external parts suffer most which, speaking psychologically, are most under the command of the will, and which, physiologically speaking, have the greater number of different movements at the greater number of different[1] intervals. That parts suffer more as they serve in voluntary, and less as they serve in automatic operation, is, I believe, the law of destroying lesions of the cerebral nervous centres. It may be illustrated in the hemiplegic region itself; that limb which has the more voluntary uses—the arm—suffers more.

I have illustrated by a case of hemiplegia of limited range from a lesion of moderate gravity. But from lesions of different degrees of gravity we have hemiplegia of very different ranges, varying gradually from palsy of the face, tongue, arm and leg of one side, to universal powerlessness.[2] Or, physiologically speaking, there are all degrees, from paralysis limited to the most voluntary parts of one side of the body to paralysis of the most automatic parts of the whole body. The movements of the heart and respiration are less frequent, and the temperature is abased (soon after the seizure, of course, is meant). The patient, to put it in the shortest way, *is reduced to a more or less automatic condition*, according to the gravity of the lesion.

It must be added that degrees of hemiplegia are not simple degrees; that is to say, they are not either degrees of more or less loss of power only, nor degrees of more or less range only, but of both. They are compound degrees. For example, if there be paralysis not only of the *most* voluntary parts of the body, face, tongue, arm and leg, but also of those next most voluntary (or, in equivalent terms, of those next least automatic, viz., loss of certain movements of the eyes and head and side of the chest), we find that the most voluntary parts (face, arm and leg) *are very much paralysed*. In other words, the graver the lesion, not only the more are the most voluntary parts paralysed, but the further spread to automatic parts is the paralysis.

From these facts, supplied by cases of destroying lesions of the centre producing *loss* of movements, we may conclude that the physiological order of representation of movements in the corpus striatum is such that action in health spreads from the automatic to

[1] I shall use (and, after the physiological definition, without any pyschological implication) the words "voluntary" and "automatic." It is not to be implied that there are abrupt demarcations betwixt the two classes of movements; on the contrary, that there are gradations from the most voluntary to the most automatic.

[2] Of course the term "hemiplegia" becomes a misnomer when there is universal powerlessness. I shall have more to say of the universal powerlessness which occurs from disease of but one side of the brain when I consider convulsive seizures.

the voluntary; or rather (the unit of action of the nervous system being a double unit, a molecule of two atoms) that there is *first* action spreading from the automatic to the voluntary, and then action spreading in the reverse order.[1] The spreading of healthy movements is best illustrated by degrees of "effort," as in lifting weights. There is first fixation of the more automatic parts of the arm, side of chest (and still further in automaticity according to the preconceived degrees of heaviness of the object), before the most voluntary part, the hand, grasps the weight and then lifts it. The heavier the weight, not only the more strongly are the most voluntary parts used, but the further does the movement spread to the more automatic parts. This compound spreading of healthy movement corresponds to the compound degrees of hemiplegia.

I will try now to show that the physiological order of gross movements applies to the movements of speech. I say *movements* of speech advisedly, as I think the abrupt distinction made in the expressions "loss of memory for words" and "ataxic affection of speech" is arbitrary and misleading. (On this matter more will be said later.)

The physiological order applies to the classification of the whole of the phenomena of cases of so-called aphasia to the positive—the inability to speak; and to the negative—the ability to understand speech. Taking an ordinary case of entire *loss* of speech, we find that the patient has lost the most voluntary form of expression (speech), and has not lost the most automatic (emotional manifestations). We find that pantomime, which, bordering on gesticulation, stands half-way, suffers little. We find that the exception to the statement that the

[1] That the unit of action of the nervous system is double the unit of composition is inferable from the fact that the whole nervous system is double; this conclusion runs physiologically parallel with the psychological law that all mental operations consist, fundamentally regarded, in the double process of tracing relations of likeness and unlikeness. The lower parts of the nervous system are plainly double in function, and it would be marvellous if the higher parts were not so too. The most automatic of the higher movements of the body "practically" constitute a single series, although we see that they are in duplicate. The two sides of the chest act so nearly together in time, and so nearly equally in range, that there is "practically" but one movement. But the very highest movements—those for words—are *apparently* in single order too, but for the very opposite reason. It is because we only consider the *end* of word-processes (speech), and neglect altogether the prior automatic reproduction of words. In the double action, of which the second part is speech, there is first, I suggest, the automatic and unconscious reproduction of words. Later in this paper will be given facts which tend to show: (1) that the unit of action of the nervous system is double the unit of composition; (2) that the higher the nervous processes are the more unlike become the two components of the unit of action; (3) that the unlikeness is first in time, one acting before the other, and second in range, one being in stronger action than the other.

patient is speechless (for he can usually *utter* some one or two words) is frequently the exception proving the rule. He has lost speech altogether, *except the most automatic of all propositions*—"*yes*" and "*no.*" Even these real words are often only of interjectional value; they can often be used only along the emotional manifestations, can be used, that is to say, automatically only. And, curiously, we find occasionally that the patient who can *reply* "No" correctly may be quite unable to *say* "No" when told. Another occasional exception proves the same thing: He may *utter* oaths or other ejaculations when excited, which he cannot *say*, cannot repeat, when he tries to do so. Occasionally he gets out ejaculations of a less automatic character (less general in the sense of being suitable to fewer occasions). Thus he may say "Thanks," "Good-bye," on fit occasions, but not when he tries. In a narrow corner we see the same thing: he may be unable to put out his tongue when he tries, and yet move it well in all automatic operations. But there is a far wider and far more important illustration to be given. Coining the word "verbalizing" to include all the modes in which words serve, we see that there are two great divisions, or rather extremes of verbalizing, one is the voluntary use of words (speech); the other is the automatic use of words as in receiving speech of others. Now in the ordinary "specimen" of loss of speech the former is lost and the latter is intact. The patient cannot speak at all, but understands all we say, on simple matters at any rate. That he cannot write is simply loss of speech in another form. For the physiological reality of speech it matters nothing whether the proposition be uttered aloud or to ourselves; it is enough that certain nervous powers *be excited, and excited in definite order;* if they be strongly excited, there is external speech; if slightly, there is internal speech. So that internal speech and internal reproduction of words are not synonymous; there is a voluntary internal reproduction of words in new and propositional forms (as occurs when we write); and there is an automatic internal reproduction of words in old and acquired forms or in forms given us, as when we receive and understand words in propositions spoken to us.

This physiological order will, I think, be of great use in the investigation of mental diseases proper. It seems to me to apply, at any rate, to some comparatively simple mental symptoms which occur in general physicians' practice. After some epileptic or epileptiform seizures, the patient becomes strange or outrageous, and acts queerly or violently. My speculation is, that in these cases he is reduced by

the fit to a more automatic mental condition. Thus I have recorded the case of a man (*Lancet*, March 18, 1871) who walked eight miles in a state like that of somnambulism. He was subject to fits, beginning by a subjective sensation of a disagreeable smell, and depending on (as, I suppose, *petit mal* always does) changes in the region of the anterior cerebral artery. Now, just as after a fit of unilateral convulsion a patient is often reduced to a more automatic condition, so far as his *physical* state goes—he is left hemiplegic on one side—so I suppose this patient was reduced to a more automatic condition, so far as his mental state was concerned.[1]

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[1] In cases of slow deterioration of brain, the disposition "alters"; I fear that it is that the natural disposition has its way, and that our more animal, our more instinctive habits and desires are no longer subordinated. There is reduction to a more automatic condition; there is dissolution, using this word as the corresponding opposite of evolution. The weaker the mind the more do the more automatic desires have their own way. In a few cases of intracranial hæmorrhage, the patient becomes violent and swears; resembles the "drunken man" whose "natural disposition comes out"; the condition expressed by the proverb "*in vino veritas*" is equivalent to a reduction to a more automatic condition in which the natural impulses have freer play.

ON THE NATURE OF THE DUALITY OF THE BRAIN.

[*Medical Press and Circular*, January 14, 1874, vol. i, p. 19.]

I GIVE here a résumé of some of the opinions I have expressed during the last seven or eight years on the nature of the duality of the brain.

That the nervous system is double physically is evident enough. This is a very striking fact, but one so well known that we are in danger of ceasing to think of its significance—of ceasing to wonder at it. A truth becomes a truism. The chief significance of the duality lies, I think, in its bearing on what is most fundamental in mental operations—the double process of tracing relations of likeness and unlikeness.

The nervous system, I repeat, is physically double. I wish to show that it is double in function also, and further, in what way it is double in function. I shall speak of the brain only, taking illustrations, however, from the lower parts of the nervous system.[1]

Not long ago few doubted the brain to be double in function as well as physically bilateral; but now that it is certain, from the researches of Dax, Broca, and others, that damage to but *one* lateral half can make a man entirely speechless, the former view is disputed. Thus, Broca and Moxon suppose that but one half of the brain—the left in the vast majority of people—is educated in words, the function of the other half not being developed in words.

Prior to the researches of Dax and Broca it might have been supposed that the brain was double in function in either of two ways: (1) That action of both halves was required in any mental operation: (2) that either half (indifferently) would serve alone. Neither of these opinions can now be held, with regard to words, at any rate. The two halves are not double in function in the sense that *both* are required for speech, since a patient can speak perfectly well when the *right* half of his brain is damaged, in whatever part the damage is, and how extensive it may be. Nor are they double in the sense that the two halves are such exact

[1] I use the word "brain" to include the cerebral hemisphere and the subjacent motor and sensory tract. I use the word "encephalon" to include all parts of the nervous system within the skull. It is convenient to use the word "half"—meaning a lateral half—when speaking of the nervous system, and "side" when speaking of the body. Thus, disease in the left half of the brain produces paralysis of the right side of the body.

duplicates that *either* of them will do for speech, since extensive damage in a certain region of the *left* hemisphere will destroy speech altogether.

Speaking in more detail, we say that, in the vast majority of cases, extensive damage to the brain in the region of the corpus striatum on the left destroys speech, and that equally extensive damage in the corresponding region on the right does not affect speech at all.[1] The reader will observe that there is no expression of opinion as to the very exact part of the brain injury of which produces loss of speech. Whilst I believe that the hinder part of the left third frontal convolution is the part most often damaged, I do not localize speech in any such small part of the brain. To locate the damage which destroys speech and to locate speech are two different things. The damage is, in my experience, always in the region of the corpus striatum; but in this article it will suffice to speak of the half of the brain affected; it is admitted that there are exceptional cases; loss of speech has occurred from damage to the region mentioned on the right, and the region on the left has been damaged without any affection of speech. *But the matter of most significance is that damage to but one hemisphere will make a man speechless.* This no physician denies, so far as I know.

I shall suppose in what follows that loss of speech results from damage to the *left* half of the brain, although it matters nothing for the argument which half it is. It is enough that there is in every man one half, be it right or left, damage of which will make him speechless.

Contradictory as it may appear at first glance, I think the facts of cases of loss of speech from damage to but one—the left—half of the brain show conclusively that, as regards use of words, the brain *is* double in function. But the verysame cases show also that the two hemispheres are not *mere duplicates* in this function. I hope to show two things—(1) that both halves are alike, in so far that each contains processes for words; (2) that they are unlike, in that the left only is for use of words in speech and the right for "other processes in which words serve." We shall afterwards show that these expressions are only used to mark extremes of degree. Anticipating what has to come, we say that the right hemisphere is the one for the *most* automatic use of words, and the left the one in which automatic use of words merges into

[1] In this article I illustrate by cases of *loss* of speech, not by cases of *defect* of speech, I do this for the sake of simplicity. As will be mentioned later in this paper, there are numerous varieties and degrees of defect of speech from different degrees of damage to different parts in the region of the corpus striatum.

voluntary use of words—into speech. Otherwise stated, the right is the half of the brain for the automatic use of words, the left the half for both the automatic and the voluntary use. The expression I have formerly used is that the left is the "leading" half for words (speech). We must now say what we mean here by speech.

Speaking is not simply the *utterance* of words. The utterance of any number of words would not constitute speech. Speaking is "propositionizing." To this meaning the term speech must be rigidly kept.[1] That the speechless patient cannot propositionize *aloud* is obvious—he never does. He cannot propositionize internally. He can neither say "gold is yellow" aloud nor to himself. The proof that he does not speak internally is that he cannot express himself in writing. He may write in the sense of copying writing, and can usually copy print in writing characters. Now, if he can speak internally, why does he not write what he says to himself? He can say nothing to himself, and therefore has nothing to write.[2]

For its *character as speech* it matters nothing whether the proposition be said to oneself or spoken aloud. Anatomically and physiologically regarded, we say that the *same* nervous processes are concerned in internal as in external speech. The difference is that the excitation of these nervous processes in speaking to oneself is so slight that the nerve currents developed do not spread to the articulatory and vocal muscles; in speaking aloud the excitation is strong, and currents do reach those muscles. This fundamental similarity and superficial difference between internal and external speech must be kept well in mind.

So, then, the speechless patient has lost speech, not only in the popular sense that he cannot speak aloud, but in the fullest sense; he cannot propositionize in any fashion. If this be really so, we must not say that speech is external thought, for there is no essential difference betwixt internal and external speech. We speak not only to tell other people what we think, but to tell ourselves what we think. Speech is a

[1] It is evident enough that there is much behind speech; a proposition is but an end of a series of mental processes and a beginning of another series. But these things do not concern us just yet.

[2] In cases of *defect* of speech there is *difficulty* in writing. In some cases of defect of speech there remains considerable power of writing. I know that cases of *loss* of speech have been recorded by eminent physicians, in which ability to write was not lost. The chronic cases of this kind that I have seen have been mostly cases of pretended loss of speech. Besides, how is it conceivable that a person who has lost *speech* should be able to express himself in writing? If a person can express himself in writing, he gives proof that he has *not* lost speech. We must speak internally before we write—before we express ourselves in writing.

part of thought—a part which we may or may not exteriorize. Again, it is not well to say that thought is internal speech, for the man who is speechless (the man who has no internal speech) can think. How well or ill he can think we shall discuss later. His condition results from a unilateral lesion; his left hemisphere is damaged, but his right is healthy, and in that hemisphere there still, I suppose, lie processes for words.

There are two ways in which words serve in thought; speech is but one way, and this, whether it be internal or external, is, speaking physiologically, a function of the left cerebral hemisphere.

Those who do not limit the definition of speech as we have done, would suppose that if a man had lost *speech* altogether (internal as well as external) there could be nothing further to say about *words* in his case; for it is sometimes assumed that words serve *only* in speech. But the cases of persons who have lost speech show, I consider, that speechlessness does not imply wordlessness[1]; for if I say to a man who cannot speak at all, "Gold is yellow" (or anything not difficult[2] or novel to him), he readily understands it. This shows that he still has processes for words in his brain. His "ideas" of gold and yellow are only to be reached through words. If he had not processes for words *in himself*, how could he possibly understand my words? My words revive his words. If they did not, I might as well speak to him in a language he did not understand, or clap my hands.

To coin the word "verbalizing," to include all ways in which words serve, I would assert that both halves of the brain are alike, in that each serves in *verbalizing*. That the left does is evident, because damage of it makes a man speechless. That the right does may be inferred, because the speechless man understands all I say to him on ordinary matters. And yet since the patient cannot repeat after me, even in writing, the proposition he so readily understands (since he can only receive it and cannot give it out), it follows that the word processes which remain in his right undamaged hemisphere are not of the same kind as those by

[1] I ought to mention, however, that it has been said that cases of loss of *speech* give proof that thought is possible without words; it being tacitly assumed that the speechless patient is wordless. The speechless man can think, I suppose, because he has in automatic forms all the words he ever had; he will be lame in his thinking, because, not being able to revive words (to speak to himself), he will not be able to register new and complex experiences of things.

[2] In order that a healthy person may *understand* anything very novel or difficult, speech is evidently required—mostly internal, but it may be external. If a person be told anything complex, we may hear him telling it again to himself. This, I suppose, the speechless patient cannot do; but to superficial observation he understands everything. He understands tales read to him, and remembers their incidents.

which speech results. In other terms, word processes are not of the same kind in each half of the brain.

Let us consider the two different ways in which, as I suppose, words serve in the two halves of the brain. I illustrate by propositionizing and receiving propositions. To receive a proposition and to form one are plainly two very different things. It is true that in *each* case *our own* nervous centres for words are concerned; but when we *receive* a proposition the process is entirely automatic, and unless we are deaf, or what is for the time equivalent, absorbed, we cannot help receiving it. When anyone says to me "Gold is yellow," I am, so to speak, his victim, and the words he utters rouse similar ones in me; there is no effort on my part; the revival occurs in spite of me if my ears be healthy. Moreover, the speaker makes me a double gift; he not only revives words in my brain, but he revives them in a particular order—he revives a proposition. But if I have to say, "Gold is yellow," I have to revive the words, and I have to put them in propositional order. The speechless man can receive propositions, but he cannot form them —cannot speak.

The left half of the brain is that by which we speak, for damage of it makes us speechless; the right is the half by which we receive propositions.[1]

But this is only an imperfect way of putting it. We, as anatomists and physiologists, have to do only with nervous processes for impressions and movements, and their conditions of energizing; and, as before said, we have to bear in mind that the essential thing is excitation of nervous processes. We have not to dwell with exaggeration on *actual* movements from strong excitations. I say movements advisedly.

We have, as anatomists and physiologists, to study not ideas, but the material substrata of ideas (anatomy) and the modes and conditions of energizing of these substrata (physiology). Where most would say that the speechless patient has lost the memory of words, I would say that he has lost the anatomical substrata of words.[2]

[1] For fear of misunderstanding, let me now remark, that although betwixt propositionizing and receiving a proposition there is the difference that in the former process there is usually actual utterance and in the latter usually only internal revival of words, this is not the most essential difference. The essential difference is not that betwixt the internal and external use of words, for speech may be internal; we can, and constantly are speaking to ourselves. The difference is in, or corresponds to, the voluntary and automatic use of words.

[2] Psychology is the elder science; mental operations were studied before the brain was known to be the organ of mind. Hence, however much we may wish to study the anatomy and physiology of the higher parts of the nervous system without psychological bias, we are obliged, for lack of others, to use words which have psychological implications. The words "voluntary" and "automatic" are such words, but they are also used physiologically.

The anatomical substratum of a word is a nervous process of a highly special movement of the articulatory series. That we may have an "idea" of the word, it suffices that the nervous process for it energizes; it is not necessary that it energizes so strongly that currents reach the articulatory muscles. How it is that from any degree of energizing of any kind of arrangement of any sort of matter we have "ideas" of any kind is not a point we are here concerned with. Ours is not a psychological inquiry. It is a physiological investigation, and our method must be physiological. We have no direct concern with "ideas," but with more or less complex processes for impressions and movements.

When *movements* of words are spoken of, it is not necessarily meant that *actual* movement of the articulatory muscles occurs. As already mentioned, there is in the left hemisphere during internal speech simply a slight excitation of the *highest* of the nervous processes of the articulatory series, which are strongly excited when words are actually uttered. Similarly, in the automatic revival of movements for words in the right side of the brain (as, for example, in receiving speech of others), there is supposed to be a slight excitation. These may be spoken of as nascent movements, or "ideal" movements. Saying nothing of dreaming that we are speaking, of dreaming of objects and of the internal sight of the blind, there is plenty of positive proof from morbid conditions that central excitations give us ideas of movements when there are no actual movements. The most striking is the production of movements, necessarily ideal, of an absent hand by faradizing the stump. The excitations in this case must be central, awakened by a stimulus of the sensory nerves roused into activity by faradism. The excitation of sensori-motor processes for words, even in the right cerebral hemisphere, may be so strong that these words are occasionally actually uttered. Thus, a speechless patient whose left hemisphere is damaged may occasionally swear when vexed. We now, therefore, classify the movements of verbalizing physiologically into voluntary and automatic, which classification corresponds to propositionizing and to receiving propositions. So now I say the right half of the brain is for the automatic reproduction of *movements* of words, and the left the side for their voluntary reproduction.

But here we must mention that this distinction is not absolute; there are nowhere in the body absolute demarcations betwixt voluntary and automatic movements; and there are in health all gradations from the most automatic use of words to their most voluntary use. Let us show some of the steps: (1) Receiving a proposition. (2) Simple and

compound interjections, as "Oh!" and "God bless my life!" (3) Well-organized conventional phrases, as "Good-bye," "Not at all," "Very well." (4) Statements requiring careful, and, metaphorically speaking, personal supervision of the relation each word of a proposition bears to the rest. We now amend the former statement, and say that the right is the automatic side for words and the left the side where automatic use of words *merges into voluntary use of words* (speech). In healthy persons, I suppose there is automatic revival of words prior to their voluntary revival (speech).

ON THE NATURE OF THE DUALITY OF THE BRAIN.

[Continuation *Medical Press and Circular*, January 21, 1874, vol. i, p. 41.]

THE double conclusion that the speechless man has lost speech (in the fullest sense that is, not being able to propositionize in any way), and that he has not lost the automatic use of words, harmonizes with the general law I have tried to establish as to the effects of all lesions of the cerebral division of the nervous system. The law, I believe, is that the most voluntary or most special processes suffer first and most. It is only the complementary expression to say that by lesions of the cerebral division of the nervous system, *the patient is reduced to a more automatic condition*. Thus, using the word language in an unusually extended sense, so as to make it include all modes of expression (passive and active), we can say that the patient who has lost speech is reduced to a more automatic condition of language. I will illustrate this point at length. In doing so I must take into consideration the whole of the speechless man's condition—what he can do in language as well as what he cannot do—or we shall not be able to answer the question, "What is the condition of the man's mind out of whom, so to say, speech has been taken?" I submit that this question is not put fairly when it is assumed that the *speechless* man is *wordless*.

Since there are all degrees of gravity of lesion—and many varieties in exact position of lesion—it is plain, a priori, that the "varieties" of defects of speech will be unlimited. And so they are. It is most important to bear this in mind. We shall, however, make an arbitrary limit. We shall continue to take for illustration a chronic case of *loss* of speech; we shall take a case such as may be fairly called "an ordinary specimen of *loss* of speech."

The first great illustration is that there is loss of the most (special) voluntary form of language (speech) without loss of more automatic (emotional manifestations). The patient smiles, laughs, and varies the tone of his voice, and may be able to sing. We find that pantomime which stands half-way suffers little, and gesticulation is not affected at all. As I used to put it, there is loss of intellectual language with conservation of emotional language.

The next illustration shows an exception proving the rule. Most so-called speechless patients can utter the words "yes" and "no." (Each of these words is in effect a proposition.) See the great significance of this common exception; the patient has lost all speech except the two most automatic of all propositions. And even these are often not propositional in function; they are often only of interjectional value; they are uttered with variations of voice to show states of feeling, and are then purely automatic. Nay, we have in the case of one of these propositions decisive evidence of the reality of the distinction we have just made. The word "no" may be uttered automatically by a speechless patient who cannot utter it voluntarily; he can *reply* "no" when he cannot *say* "no." I will recapitulate these significant facts.

There are three degrees of use of the word "no." It is used most voluntarily (as speech) when the patient can *say* it when told. It is used more automatically when the patient can *utter* it in reply correctly; and it is used most automatically when it only comes out like an ordinary interjection with states of feeling.[1]

At this stage let us recapitulate. As it were, looked at superficially, the speechless man is seen to have lost the most voluntary or special part of language (speech), and not to have lost the more automatic language of emotional manifestation. He is in this way reduced to a more automatic condition of language. And then, as it were, by looking more closely, we see (*vide supra*) that of the double process of verbalizing he has lost the more special or voluntary half only; for we found that, although he could not use words voluntarily (could not speak), he yet retained the automatic use of words (could understand what was said to him). Here, again, he is seen to be reduced to a more automatic condition of language. Taking this as being his ordinary condition we have now to consider what occurs in his verbalizing series when he is subject to strong stimulation. We shall find that, starting from that extreme of verbalizing which consists of the most automatic use of words, and which is intact, there occur utterances of diminishing degrees of auto-

[1] Of course, the man who has the first use has the second and third uses of the word. One of my patients who could not *say* "no" could utter it readily in reply to a question, and would, his wife told me, make his children "behave when they were at the the top of the yard" by shouting "no, no, no," in an angry tone. This patient was the subject of clinical remarks to my class at the London Hospital. I told the students that he could say "no." But, to my chagrin, I could not get him to say it. This puzzled me, for I had heard him utter the word scores of times. Soon it occurred to me to ask the preposterous question, "Are you a hundred years old?" Then he replied, "No." But, very strangely, when I said, "Now say 'No' again," he could not.

maticity nearly up to the simplest voluntary use of words (speech) which he has lost. (We shall show this from several cases.) Observe that we use the word "utterance," for the patient cannot speak his utterances (cannot repeat them when he wills); they are brought out of him by strong stimulations, and these stimulations are, in the case of such deeply automatic utterances as oaths, wide bodily states (emotional states).

Under excitement the speechless patient may *utter* other words and phrases; but these also are exceptions proving the rule; they are interjections, simple, as "oh," or compound, as "God bless my life." Oaths and other more innocent ejaculations have, in spite of their propositional structure, no propositional function. No man intends to *say*, nor is believed by others to *say*, anything when he swears at his own eyes.[1] The Communist orator did not really make a blunder when he began his oration, "Thank God, I am an Atheist," for the expression "Thank God" is used by careless, vulgar people simply as an interjection, there being no thought at all about its primitive meaning. Such ejaculations are verbal utterances more automatic than speech, and less automatic than the use of words in receiving speech of others. They stand betwixt the two extremes. Their automaticity is proved by the fact that the patient cannot repeat them; he may swear, but cannot *say* his oath. But we find still less automatic links than these betwixt the two extremes of verbalizing.

It will be found that a patient who is speechless and who may swear will sometimes also utter words which are not merely automatic signs of his then state of feeling, but which have also a flavour of applicability, e.g., "That's a lie." Still the applicability is in such a case not special. Such an expression is used rather as an offensive missile than as a proposition. Nevertheless, it is a little less automatic than an oath—it is a shade nearer to speech.

I now give an illustration from a class of utterances higher still—an utterance under excitement of a less general character, or, otherwise described, nearer to speech—nearer to the voluntary use of words. My friend Dr. Langdon Down told me this very striking case: A woman was paralysed on the right side, and remained speechless for six months, when she died. She could always say "Yes, but you know," but nothing more; there was one day a single striking exception. This was when a child was in danger of falling, and then she cried out "Take care."

[1] Hence the line, "He knew not what to *say* and therefore *swore*."

Such an expression, however appropriate, has most affinities to emotional utterances; it is still very general, and is applicable to innumerable circumstances.[1]

But the occasional[2] utterances of speechless patients do not stop even here. I had a patient under my care, who said only "Wo, wo," and afterwards, "Pooh, pooh," always doubling the word. This was one of the very worst cases of affection of speech I have seen. His voluntary power in general seemed to be very much impaired. To use a common expression, "I never could make anything of him."[3] Yet I was assured that this poor fellow one day said "better," and that once after his son had been long urging him to say if he knew him the patient got out this sentence, "How is Alice getting on?" More than this, he had told his son where his tools were by uttering the one word "Master's." Although here is but one word, it clumsily conveys a proposition, the other terms being understood. It is the most special utterance I have ever known from a speechless patient. Indeed, this speechless man did almost speak.

These facts show that the speechless man retains, to some extent, the power of uttering words; we ought rather to say that words come out of him automatically on fit occasions. He cannot *say* what he

[1] I used to receive very incredulously the statements the friends of patients and others gave me about the occasional utterances of speechless persons. In a case I have recorded, I could not believe that a patient from whom I could never get a word ever said "Take me home." My former unbelief was one day brought back to my mind rather forcibly. A most intelligent student, Mr. Frederick Mackenzie, gave me particulars of the case of a patient who died with disease of the left hemisphere. Soon afterwards I was talking to this gentleman of such utterances as I have mentioned. He remarked to me that this patient's wife had, with indignation at his (the student's) incredulity, affirmed that her husband, otherwise always speechless, said before he died, "God bless you, my dear." He had thought it so improbable that he had not mentioned this ejaculation in the notes he gave me. It was, although of most general applicability, a painfully appropriate utterance for a dying man to make to his wife.

[2] It is proper to remark here that M. Baillarger has written: "L'analyse des phénomènes conduit à reconnaître, dans certains cas de ce genre, que l'incitation verbale involontaire persiste, mais que l'incitation verbale volontaire est abolie. Quant à la perversion de la faculté du langage caractérisée par la prononciation de mots incohérents, la lésion consiste encore dans la substitution de la parole automatique à l'incitation verbale volontaire." In the following sentence, apropos of a particular case, he speaks more generally: "Il est bien évident qu'ici l'incitation motrice volontaire était abolie et que l'incitation motrice spontanée persistait." M. Baillarger has also made some very important observations on incoherence in cases of loss of power to talk voluntarily. I do not know, however, that anyone but myself has advanced any hypothesis as to the duality of word-processes, and the relation of the elements of the dual to halves of the brain.

[3] The following illustration will show this: I one day tried to examine his eyes, and therefore told him to look in certain directions. The examination was almost impracticable. He made efforts, but he never did what I told him, whether it was to look in a particular

utters. It is plain that he has somewhere in him processes for words; but the fact that they are uttered only under excitement, and that they are nearly always well-organized formulæ, and that the patient cannot repeat them, shows that they are not speech. Observe the two things: they are well-organized formulæ, and they are only uttered under strong stimulation, which is not the "stimulus of the will," to use a hackneyed expression. We may fairly conclude that they stand betwixt speech proper and the most automatic use of words, as in receiving speech of others. At the very least the evidence seems to me to point to the conclusion that in the speechless man the most automatic use of words is quite intact. The inference is, that in health there is in the verbalizing process, of which speech is all that is apparent, double action.

There is evidence of a still more general kind. I believe that doubleness in the verbalizing series is but one instance of doubleness in all the nervous processes of the organism. I will try now to show this. In the instances to be given I am not about to compare mental operations with physical movements. I wish to compare the *movements* of words with other classes of movements. Such a comparison could not be entered upon if we used psychological terms, speaking of "memory for words," instead of movements for words. I repeat, that we are not about to compare and contrast mental phenomena with physical phenomena, but physical phenomena underlying certain mental phenomena with other and grosser physical phenomena.

direction or to keep his eyes still. Instead of opening them, he opened his mouth or screwed up his face or shut his eyes, and could not be got to look in any particular direction, although he seemed on the alert to act, and was all the time doing something with his muscles. On but one occasion did he get his tongue out, and then after the nurse had put hers out for his imitation.

It is only in the worst cases that voluntary power is damaged in its most general manifestations. But there are a few cases in which the inability to protrude the tongue continues for some months. I have seen a speechless patient who usually sat up in his room, whose face looked intelligent, who was cheerful and merry, and who seemed to understand all that I said to him, who could not put out his tongue when he tried. His daughter, a very intelligent woman, remarked that he could put the tongue out, as she expressed it "by accident," and added, as an illustration of her meaning, that when anyone was leaving him he could say "good-bye," but that he could neither put out his tongue nor say "good-bye" when he tried. He could say "yes," and "no" at any time; and, using the lady's expression, could say, "good bye," "well," "never," *by accident*. She further remarked that the patient would sometimes swear. Although a foreigner, he uttered the short explosive word which is so much in favour with English swearers, but he could not repeat the word when he tried. She asked him to utter the explosive sound when I was there. He laughed and shook his head. The facts of this case are important. The inability to put out the tongue is a fact of the same order as the inability to speak. It may mislead the inexperienced to suppose that the speechlessness depends on paralysis of the tongue. The tongue, however, is not paralysed, the easiest proof being that the patient swallows well.

If we look at the most automatic of visible movements—those of respiration—we *see* that they are double, although sides of the chest move nearly equally in range, and they move nearly contemporaneously. It would be marvellous if the highest nervous processes differed *fundamentally* from the lower. It would not, perhaps, seem marvellous if we were studying mental operations only from a psychological point of view, for it will be said that mental operations are under a different regime from physical. We, as physiologists, of course must admit that the movements underlying mental operations differ from such movements as those of respiration. But what I do not admit is that they differ fundamentally. The "form" of co-ordination will be the same throughout the nervous system, notwithstanding special differences. If there be double action in one part there will be in another.

Since the movements of respiration are nearly equal in range, and occur nearly if not quite together in time, there seems to be but one movement. "It is a unified double." Thus, these movements seem to constitute, and in one sense *do* constitute, a linear series, but really we see that they are double.

Similarly the movements of verbalizing *seem* to constitute a linear series, but for a very different reason. If we limited ourselves to the voluntary process of verbalizing—to speech—we should have no doubt that there was only a linear series, for the words of proposition are in linear order. In reality, speech is but the result of an earlier process. Before a proposition is uttered, before voluntary use of words, words must have been automatically revived. The double process in verbalizing seems to be linear, because the parts of the two halves of the brain serving in verbalizing do not, like the parts of the nervous system superintending respiration, act equally in range[1] and together in time. On the right half there is faint automatic reproduction of words *before* the stronger voluntary reproduction on the left.

To repeat, the most automatic of the visible movements of the body seem to constitute a linear series, because both sides act equally in range and together in time; the most special movements of the body, those

[1] Strength of excitation of central nervous processes is the equivalent of increase of range of movements. The proper comparison may seem to be as to differences in the expenditure of nervous force in the two halves. As it appears to me, increase of quantity of nervous discharge tends not only to more powerful movement, but to movement of a wider range; it produces a compound effect. An increase and strength of excitation of the highest processes would be, on its psychological side, not only a more vivid conception of the leading idea, but the development of other ideas automatically associated with it, an increase of range.

of verbalizing, for example, *seem* to constitute a linear series, because one half of the brain acts faintly and before the other; but in each case there is double action. The lower processes of the body are a near approach to a "dead double"; the action of one side of the chest is practically a duplicate of the other, and occurs at the same time;[1] but in the higher processes the doubleness is marked, because of the two actions one is slighter than and occurs before the other. In each case the unit of action *is* double.[2]

But, it may be asked, how do you know that speech is preceded by the *automatic* reproduction of words? A priori, the evidence is strong.

That automatic action must precede voluntary action is, I submit, certain. In gross physical operations we see that it is so. We cannot use the hand before we fix the wrist, nor the arm before the shoulder is fixed, and in heavy strains with this limb, the chest is first fixed and the glottis is closed, after a full inspiration. The more automatic muscles must be in action before the more voluntary, or there would be no *point d'appui*. Taking a psychological illustration, we note that we desire before we will.[3]

In the case of speech we loosely remark that a person speaks as he likes; but how comes it that he does like to utter any particular proposition. If I say, "this blotting-paper is red," the words must have been automatically revived before I uttered them, or why should I have said *that*? But saying they are automatically revived is not saying that they revive themselves. I had the images blotting-paper and red

[1] The lower processes are, we see, co-existent. I believe that the most fundamental law of developmental education of the mind is the continuous reduction of successions to co-existences. Things, as voice, automatic use of words, and voluntary use of words, which were developed in successive order, come more and more nearly into simultaneous order; this is one aspect of becoming more and more automatic. The child is born with voice, then acquires automatic use of words (being able to receive speech before it is able to speak), and then speaks (probably first appropriating simple speech formulæ of others). After awhile all these progressively added operations occur practically simultaneously in the utterance of conventional phrases, or, at least, in such utterances as "You don't say so?" used interjectionally. Operations occupying many separate units of time come to occur in fewer or in a single unit of time.

[2] Besides, a proposition is not a string of symbols, each word referring independently to that perception of which it is the symbol. The meaning of a proposition is one, not two meanings in juxtaposition.

[3] "That every one is at liberty to do what he desires to do (supposing there are no external hindrances), all admit; though people of confused ideas commonly suppose this to be the thing denied. But that everyone is at liberty to desire or not to desire, which is the real proposition involved in the dogma of free will, is negatived as much by the analysis of consciousness as by the contents of the preceding chapter" (Herbert Spencer, "Principles of Psychology," second edition, vol. i, p. 500).

in my mind, and these roused the two words automatically before those words could be put in propositional order, before speech was possible.

So far we have spoken only of words, but since words have no meaning unless they refer to things, there is a mental process besides verbalizing.

In popular language words are said to contain or to be symbols of ideas. In physiological language we say that the highest sensori-motor processes of the word series have organic connexions with the sensori-motor processes of other series. In illustration, we shall take one other series, that which refers to objects. We shall, for convenience, speak of gross and simple external objects.

In taking for illustration the two senses, sight and hearing, and the movements corresponding,[1] we are illustrating by the two most important elements of the anatomical substrata mind. The greater part of our mental operations are carried on in auditory and visual ideas. In the investigation of what is often called the "physiology of mind," these two senses, or rather the cerebral processes thereto corresponding, are our chief concerns.[2]

[1] I say "movements corresponding" because I consider it to be erroneous to suppose that the unit of composition of the highest nervous processes is of a kind fundamentally different from that of the lower; it will be a sensori-*motor* process in the highest as well as the lowest. When we actually see a brick there is necessarily a motor element, and in ideally seeing it—seeing it mentally when it is absent—there will be a nascent excitation of the element of the central process corresponding with ocular movement as well as of that corresponding with retinal impressions. The sensory element corresponds to the "secondary," the motor to the "primary" qualities of the brick. As will be mentioned farther on, I think that the anterior part of the cerebrum is the chiefly motor region, and the posterior the chiefly sensory region of the brain. This is almost equivalent to saying that in the highest ranges of evolution the sensory and motor elements of nervous processes are largely separated geographically; but this does not imply that they do not act together, together in the sense of immediate succession I mean, for in the simplest reflex action the movement *follows* the impression. But in the highest processes the move does not, we may suppose, follow immediately. I believe the separation in the highest processes is significant in what is psychologically abstraction. To take a narrow illustration: after seeing a red square and a blue round we can think of a red round and a blue square. We can transpose primary and secondary qualities; we can transpose ocular movement and retinal impressions.

[2] "Mental actions, ordinarily so-called, are nearly all carried on in terms of those tactual, auditory, and visual feelings which exhibit cohesion and consequent ability to integrate in so conspicuous a manner. Our intellectual operations are, indeed, mostly confined to the auditory feelings (as integrated into words), and the visual feelings (as integrated into impressions and ideas of objects, their relations, and their motions). After closing the eyes and observing how relatively immense is the part of intellectual consciousness that is suddenly shorn away, it will be manifest that the most developed portion of perceptive mind is formed of these visual feelings which cohere so rigidly, which integrate into such large and numerous aggregates and which re-integrate into aggregates immensely exceeding in their degree of composition all aggregates formed by other feelings. And then, on rising to what we, for convenience, distinguish as rational mind, we find the integration taking a still wider reach" (Spencer's "Psychology," vol. i, p. 187).

Just as we have in our brains educated processes for a great number of words, so we have educated processes for a great number of objects. The sensori-motor processes of the former are central processes built out of auditory impressions and consequent articulatory adjustments. (These we may label the audito-articulatory series.) The processes educated in objects are central processes built out of retinal impressions and ocular adjustments. (These we may conveniently call retino-ocular.)[1] Thus we learn the word *ball*, by hearing it, and by the consequent articulatory adjustments. We "learn" the object ball by receiving retinal impressions and by the occurrence of consequent ocular adjustments. There is a motor element in each of these series. Since the two were learned together the two learnings grow up in inseparable association. The sensori-motor process for the word "ball" is in such organic connexion with the sensori-motor process for the object ball that when one is developed by excitation the development of the other must follow, provided the excitation of the former be strong enough. This is what I suppose is the anatomical and physiological equivalent of the popular saying that a word "contains an idea."

The next question is, "What are the relations betwixt these two series, the audito-articulatory and retino-ocular," the process for words and images of objects?

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[1] For simplicity I arbitrarily exclude the other movements of the body which are concerned with or after ocular movements.

ON THE NATURE OF THE DUALITY OF THE BRAIN.

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WE have seen that the speechless patient does understand what we say to him. But we have only traced the process by which he understands so far as the automatic revival of words on the right side of his brain. There must be something further; for if my saying to him, "gold is yellow," only revives those words (no further process occurring within himself) he can receive no *information* at all; for words by themselves have no meaning; they are symbols. But the words revived, next revive in him the images of the things they symbolize, "gold" and "yellow."[1] I reach these images through the automatic revival of words in the right half of his brain. He assents to this statement, but he dissents when I say "gold is black." But in the latter case the same process must occur. He cannot deny that "gold is black" if the images of "gold" and "black" are *not* revived. He *cannot believe* that gold is black, because, never having seen black gold, and having often seen yellow gold, the word "gold" automatically develops the process for the colour yellow; the stronger association has its way.[2] In short, there is intact in the speechless man all the processes he ever had for the recognition of objects (which is putting ideas of objects, if I may so speak, in propositional order). The speechless man has lost speech only. His audito-articulatory series is damaged in one half of his brain, but his retino-ocular is damaged in neither half. Hence, although he cannot *name* them, he recognizes objects,

[1] The following quotation is of interest with regard to the "ideal" reproduction of movements. Herbert Spencer says: "To remember the colour red is to have, in a weak degree, that psychical state which the presentation of the colour red produces." "To remember a motion just made with the arm is to have a feeble repetition of those internal states which accompanied the motion—is to have an incipient excitement of those nerves which were strongly excited during the motion" ("Principles of Psychology," vol. i, p. 448).

[2] Although in this paragraph I use the word "image" for convenience (meaning thereby the mental "ideal" representation of an object), we must bear in mind that, as is implied in the preceding paragraphs, movement enters into the anatomical substratum of every "image." The anatomical substratum for the (mental) representation of the object brick, contains a motor element as much as the anatomical substratum of the word "brick" does.

he points out in a picture any object which we name; although he cannot read he recognizes handwriting; although he cannot write he can copy writing, and he may be able to play at cards or dominoes. In none of these things is speech (the voluntary revival of words) concerned, and thus, a priori there is no reason to expect that the speechless man should be unable to perform them. For these things the action of *another* series is required, the series for the recognition of objects—the series for putting objects in relation to one another, making "propositions of objects." This series we have called "retino-ocular." If these processes were not intact in cases of loss of speech the patient could not even find his way in the streets, he could not preconceive his way. For when we go from one place to another we must make, so to speak, a proposition of the images of the two places, or of stages betwixt.

Let us state some of the facts in the last paragraph in another way. The speechless man cannot say "brick"; that he cannot say it aloud is plain, but he cannot say it all, for he cannot write it; nor helped mechanically can he "make the word" when large printed letters are supplied to him. He cannot "speak" the word to himself and so he cannot spell it. If, now, I say to him, "Give me a brick," he will do it instantly. The automatic use of words remains, and by these I can reach his images of objects. Some physicians say of such a case, "He retains the *memory* of the word." It will seem a strange assertion, but I do not think he does. To remember, or rather to recollect, a word is to be temporarily conscious of it; the physiological process being energizing of the sensori-motor process. I believe the word we utter is only a sound to his consciousness, not a special symbol, not a sound arbitrarily referring to some thing; but it is a sound which has (the consequent auditory change, I should say) organic connexion with the *automatic* movement for the word "brick," and it is through this *automatic* and entirely unconscious process that the nervous process for the image of the object brick is reached. I do not believe that the man who cannot say (nor write) the word brick can be said to have a "memory" of it (be conscious of the *word itself*). He has no consciousness of *it*, but of the thing it is the symbol of—a very different thing. There is nothing strange in supposing that there is an unconscious use of words. The hypothesis accords with the law that the more operations are automatic the less are we conscious of them; of the most automatic of the bodily operations we are not conscious at all.

We have concluded that the verbalizing (or audito-articulatory series) is double, and now we have to infer, we have, indeed, already

implied, that the retino-ocular series is double also. But just as we did not consider the audito-articulatory series to be in mere duplicate so we do not consider the retino-ocular series to be in mere duplicate. It must be admitted, however, that the direct evidence in favour of the doubleness of the latter series, or rather of the nature of its doubleness, is very vague and fragmentary. But there seems to me to be a strong a priori warrant for the assumption that there is in it a doubleness analogous to that in the audito-articulatory series. That there is involuntary revival of images seems to me to be clear, since I can compel any one to have before him an image, for example, of a horse, by uttering the word in his hearing. I do this not only without his aid, but in spite of him. Again, it seems clear that no one can think of an object before it is presented to him[1] before it is revived; it must be automatically revived before it is voluntarily revived ("subjective" action prior to "objective" action).

To say that a train of thought leads up to it "spontaneously" is really saying this.

I submit that one half of the brain is for the automatic revival of images and one for their voluntary revival. Before giving the reasons for this hypothesis I would remark, that limiting mental operations to the audito-articulatory and retino-ocular series, the speechless man has thought so far as reviving images go. He has words which can be automatically revived so as to place images of objects in order. Although he has but one side for verbalizing—the automatic side—he has according to my hypothesis, *two* sides for the revival of images, and thus he can still think, can still have certain relations of likeness and unlikeness. No doubt he is lame in his thinking. He will be unable to learn novel and complex things, for he will be unable to keep before himself the results of complex arrangements of images. He cannot speak to himself, to

[1] It seems to me that this view clears the difficulty stated under the heading, "Attention," pp. 131 *et seq.* of Mansel's "Metaphysics." "It appears certain," Mansel says, "on the one hand, that, in order to arouse the attention of any sensible phenomenon, that phenomenon must first be presented to consciousness; while, on the other hand, it has been argued, with some plausibility, that unless the attention be previously aroused, consciousness has no intimation of the existence of the phenomenon at all." Again, "Is the phenomenon of which we become fully conscious by attention the *same phenomenon* that it was before we attended to it? Or has attention itself added an element which brings it within the sphere of consciousness?"

The reader will have remarked that we use the expression "to recognize" (not "to see"). To recognize a thing is really an act of classification (Spencer). It is really putting the image of it in a "proposition" with another image—the image of an object presented with one re-presented. The speechless man can recognize.

tell himself what he has managed to think of, things presented or represented in very novel and complex relations. He can bring two images into co-existence, existence in one unit of time, but cannot, without speech, organize the connexion, if it be one of difficulty.

Before, however, we can consider which half of the brain is concerned in the voluntary and which in the automatic revival of images, we must consider in which region of the hemisphere the revival of images in any way occurs. I believe it is chiefly[1] in the hinder part—in the posterior lobe—in other words, in the region of the thalamus opticus. That it is not chiefly in the anterior lobe (in the region of the corpus striatum) of either side is certain, for damage here scarcely ever produces any other mental defect than that of (by damage of the left half) affection of speech. The revival of images, I believe, chiefly occurs in the posterior regions of the brain. Evidence that the function of the posterior lobes differs in some way from that of the anterior, is that Lockhart Clarke has found the intimate structure of the convolutions to differ in the two regions. Difference of structure of necessity implies difference in function. It would seem that the posterior lobes are more important in intellectual operations. Dr. Charlton Bastian concludes an important article ("The Human Brain," *Macmillan's Magazine*, November, 1865, p. 71), by saying: "Still, broad groups of functions may be more intimately connected with particular lobes, and, if such be the case, then we believe the evidence in our possession *points to the posterior rather than to the anterior lobes of the cerebrum as those concerned more especially with the highest intellectual operations.*" (The italics are mine.) The posterior lobes are rarely damaged by any sort of pathological change, and thus it is difficult to settle the question by cases of disease. But the following quotation from Rosenthal strongly supports Bastian's opinion: "In the case of new growths in the posterior lobes the *psychical* disturbances are *incomparably more*

[1] I say "chiefly" because I do not believe in abrupt geographical localizations. Thus, very sudden and very extensive damage to *any part* of the left cerebral hemisphere would produce *some* amount of defect of speech, and I believe that similar damage to any part of the right hemisphere might produce *some* defect of recognition.

I may here say also that, so far as I have yet seen, the difference in the two sides in the retino-ocular series is not so sharply marked as in the case of the audito-articulatory. Not very long ago I diagnosed that a patient had tumour in his right posterior lobe, on account of a mental affection which was not loss of speech; the tumour was in the left posterior lobe.

Nevertheless, I am convinced that disease of the *right* cerebral hemisphere is more likely to cause mental defect (other than affection of speech) than is disease of the left; and, again, that mental defect is more likely to result the farther back in the hemisphere the damage is.

frequent than in that of tumours of the anterior or middle lobes." (The italics are mine.)

So far we have concluded that the revival of images does not occur in the anterior lobes, and we have brought evidence to show that the posterior lobes are more important than the anterior in intellectual operations. The latter is almost equivalent to saying that the posterior lobes are the parts in which revival of images occurs; for the greater part of our intellectual operations is carried on in images, in eye-derived or, as we call them, retino-ocular processes. On the relative importance of visual ideas I have already quoted Spencer.

I think that the left is the side for the automatic revival of images, and the right the side for their voluntary revival, for recognition. I have two reasons for thinking so. The first is one supported by anatomical facts. The following extract from an article I published [17] contains these facts: "It would seem by certain observations of Gratiolet—which are embodied in the following extract from M. Baillarger's address before the Academy of Medicine—that there is "crossed development of the brain," if we may take the corpus striatum and thalamus as fixing the (chiefly) motor and sensory regions. The first part of the quotation refers to M. Trousseau's views on the possible explanation of the rightsidedness of the paralysis of speechless patients:—

"Deux faits anatomiques ont ici une assez grande importance."

"De ces deux faits, le premier relatif à la circulation a déjà été rappelé par M. Trousseau. C'est que l'artère carotide gauche naît directement de la crosse de l'aorta tandis qu'à droite cette même artère naît du tronc brachio-céphalique.

"Le second fait a été signalé par Gratiolet, ce professeur si eminent, dont la science déplore la perte récente.

"Il m'a semblé, dit-il, par suite d'une série d'observations *consciencieusement étudiées*, que les deux hemisphères ne se développent pas d'une manière absolument symétrique. Ainsi le developpement des plis frontaux paroît se faire *plus vite à gauche qu'à droite*, tandis que l'inverse a lieu pour les plis des lobes occipitaux et sphénoidaux." (Leuret et Gratiolet, "Anatomie du Système Nerveux," p. 241.)

It would seem by this, at all events, that the "important side" of the left hemisphere is the anterior lobe, and the important side of the right the posterior lobe. However, I have to say that Carl Vogt denies the truth of the observation that the left frontal convolutions are developed in advance of those of the right. Whether Gratiolet's

statement that the sphenoidal and occipital convolutions of the *right* side are developed in advance of those of the left is denied or not I do not know, nevertheless, his name will have some weight to keep the question an open one. M. Barkow, and after him M. Broca, find "que les circonvoultions sont notablement plus nombreuses dans le lobe frontal gauche que dans le droit, et que *tout à contraire le lobe occipital droit* est plus riche en circonvolutions que le gauche. (The italics are mine.) Carrier ("Etude sur la Localisation dans le Cerveau de la Faculté du Langage articulé"), from whose admirable paper I take this observation, goes on to say, that Broca finds that the *left* frontal lobe is sensibly heavier than the right, and that since the two hemispheres are nearly of the same weight, there must be compensation by difference in the two occipital lobes."

These anatomical facts, I submit, support the view I put forward, that the posterior lobe—or let us speak more generally—the hinder part of the brain on the right side, is the chief seat of the revival of images in the *recognition* of objects, places, persons, &c. The other evidence is supplied by cases of disease, and I may at once say that it is slight and doubtful.

But before we proceed to this evidence we must consider how loss of power to revive images voluntarily—that is, recognize—would appear as a symptom; in other words, what would be the obvious result of damage to the retino-ocular series; in other words still, what in the retino-ocular series would correspond to loss of speech in the audito-articulatory series. Such a condition would be one of imbecility. The condition of a patient who could recognize nothing, would pass as a general, not as it really would be, a special mental symptom. In such a case speech would be affected in a sense, still, in the strict sense, speech would not be affected, i.e., directly affected. The patient would have no motive to speak, he would have nothing to speak about.

In a *minor* degree, such a state would be one which the patient or his friends would call "loss of memory." The patient would have *difficulty* in *recognizing* things; he would have difficulty in relating what had occurred, not from lack of words, but from a prior inability to revive images of persons, objects, and places, of which the words are the symbols. He would not be able easily to objectivize. He could not put before himself ideal images of places one after another; could not re-see where he had been, and could not therefore tell of it in words. This again might be looked on as a *general* mental defect, not as a defect really as special as defect of speech.

It may be well to give an illustration of the kind of defect: A patient who was in the London Hospital supposed that she was at the place in Holborn where she had worked for some years, a place the image of which was in her mind more automatic. It was a case of mis-recognition, analogous to a mistake in uttering words more automatic than those intended.

We come now to evidence from cases of disease. I have noted that in cases of left hemiplegia, especially when the leg suffers more or recovers later than the arm, there is what *seems* at first glance a general loss of mental power, but which, as above said, is probably as special a loss as affection of speech is. In cases of hemiplegia, where the arm suffers much more than the leg, I believe the lesion to be placed in the region of the thalamus, that is, in the region of the posterior lobe.

Trousseau, speaking of those cases of hemiplegia in which the arm recovers more rapidly than the leg does, remarks that the patient is worse off than when the reverse obtains. It is not quite clear that Trousseau refers to failure of intellect. I think he does, for he relates in illustration the case of a man who died in a state of perfect imbecility, and he predicted that the woman whose case was the text of his lecture would die within the year a thorough imbecile. It is important to observe that the man had excruciating pain, and this symptom also Trousseau believed would follow in the woman's case. The late Dr. Bazire, in a footnote to Trousseau's lecture, speaks of the case of a patient who was seen in private practice by Dr. Ramskill for hemiplegia like that Trousseau spoke of. In less than a year this patient died, "completely demented."

But Trousseau says nothing as to the importance of the side affected in these cases. He mentions the side paralysed, it was the right; and so it was in Dr. Ramskill's patient, and as right-sided paralysis is evidence of disease of the *left* hemisphere, I have to point out prominently that these cases are in antagonism to the view I take, namely, that the *right* posterior lobe is the more important one. There were no autopsies, however, and therefore these cases do not tell conclusively against it. In each of the three cases, the imbecility came on some time after the paralysis, and thus it may be said that there was a double lesion, one on each side of the brain. I will not, however, avail myself of this explanation, because, as the imbecility occurred, so far as I know, without any further attack, it is simply begging the question. The defect I speak of is mainly a sensory defect,

and thus it does not follow that (as loss of speech depends on disease of the brain near the corpus striatum), loss of power to recognize depends on changes near to the thalamus; they may be deep in the posterior lobe.

As will be seen, my facts are very few, but I do think that patients who have that variety of left hemiplegia in which the leg suffers more than the arm, have greater mental defects of the kind I speak of than occur in other kinds of hemiplegia on the right or left.

It is important to note the effects of plugging of the posterior cerebral artery, which vessel supplies the posterior lobe, and also (what is significant) sends a branch to the corpora quadrigemina. I have seen but one case of this kind, and as in that case *both* posterior cerebral arteries were blocked, and also the right middle cerebral, the case is scarcely worth mentioning as evidence.

REMARKS ON NON-PROTRUSION OF THE TONGUE IN SOME CASES OF APHASIA.

[*The Lancet*, May 18, 1878, vol. i. p. 716.]

RESPECTING this interesting and curious clinical phenomenon, Dr. Hughlings Jackson remarked :—

It will have been noticed by every medical man that some patients who have loss or defect of speech do not put out the tongue when they are asked. For the present we shall consider cases of *loss* of speech. The patients know what is wanted; they do the preliminary thing—opening the mouth—but very often the tongue lies flat and motionless in the floor of the oral cavity. The patient may put his fingers in his mouth to help the organ out. That the tongue is not paralysed (we mean in the ordinary medical sense of the term paralysis) may be proved in several ways. As a rule, the patient, who can *say* nothing, can *utter* something: he has a stock word or phrase which comes out at any time. This is best called a "recurring utterance." The word or phrase being clearly articulated, is decisive evidence that the tongue is not paralysed. Then there are in some cases "occasional utterances." The patient may swear, or get out more innocent ejaculations as "Oh dear!" These also are clearly articulated. Yet very early in a case of loss of speech there may be no sort of utterance. Then we can demonstrate that the tongue is not paralysed by getting the patient to eat and drink. He will eat and swallow quite well, which he could not do were his tongue paralysed. Again, after failing to put out his tongue when he tries, the patient may stick it out well to lick his lips. In one case an aphasic woman was vainly urged to put out her tongue. Mr. Lewis Mackenzie, the resident medical officer, got it out by a trick; he had found that after drinking she would stick her tongue out to lick her lips; she did so on this occasion.

This is a matter of great importance. In some cases of acute cerebral disease the non-protrusion of the tongue would be of great value in helping to the diagnosis of aphasia, as one symptom of that acute disease. In any case it would be a great blunder to suppose there to be paralysis of the tongue from disease of the lingual nerves or their

nuclei in the medulla oblongata, because the patient did not put out his tongue when asked, and when he tried. It is a thing of great scientific interest; considered along with some other symptoms of aphasia, it gives us a clue to the physiology of the whole of aphasia. Let us mention some other symptoms of fundamentally like significance.

Those who have examined the eyes of many aphasics will remember cases in which the use of the ophthalmoscope was very difficult; some aphasics do not, and apparently cannot, direct their eyes as they are told. Of course, in some cases of aphasia, there may be for a few hours or days, or in rare or severe cases for several weeks, lateral deviation of the eyes, from the side paralysed, as part of the hemiplegia; but we just now refer to chronic cases in which there is no ordinary affection of the ocular muscles; the difficulty is not in looking to one side in particular. Indeed, we see the same kind of thing in some people whose nervous systems are sound. Some people are unable to draw in their breath deeply when told to do so during stethoscopic examination; we have to tell them to cough. It is next to impossible to get some patients to frown (as in suspected one-sided facial paralysis), even if we make a frown for them to imitate. Returning to aphasia. The recurring utterance is often "Yes" or "No," or the patient may be able to utter both these words. Some of these patients can utter "No" emotionally, and some can do this, and can also reply with it (use it propositionally). But of those who can reply with it, there are some who cannot say it when told. After failing to get them to say it when told, we can easily get the word out as a reply to a question requiring dissent. Similarly of occasional utterances of less automaticity; a patient may swear well on proper (scientifically proper) occasions, and yet be unable to repeat the ejaculation, or any word of it. The same applies to occasional utterances of still less automaticity, as is illustrated by the following excerpt from an unpublished paper by Dr. Hughlings Jackson, written ten years ago: "I have seen a patient who usually sat up in his room, whose face looked intelligent, who was cheerful and merry, and who seemed to understand all that I said to him, but who could not put out his tongue when he tried. His daughter remarked that he could put the tongue out, as she expressed it, 'by accident,' and added, as an illustration of her meaning, that when anyone was leaving him, he could say 'good-bye,' but that he could neither put out his tongue nor say 'good-bye' when he tried. He could say 'yes' and 'no' at any time; and, using the lady's expression, could say 'good-bye' 'well,' 'never' *by accident*. She further remarked

that the patient would sometimes swear. He uttered the short explosive word which is so much in favour with English swearers, but he could not, she said, repeat the word when he tried. She asked him to utter the explosive sound when I was there, saying it herself for him to imitate. He laughed, and shook his head."

In some cases, where there is not loss but defect of speech, we see a similar kind of thing. The patient may get out a word, or even an elaborate phrase, and be quite unable to repeat it. This shows us that in our trying to appreciate an aphasic's condition, we have not only to note what he *utters* but whether or not he can *say* (repeat) what he has uttered. We frequently find that he cannot. In some cases a patient gets out, in proper reply to a question, such a phrase as "I don't know"—one, be it observed, of considerable automaticity. Afterwards he may go on uttering it in rejoinder to questions to which it is irrelevant. The patient may show that he knows this by expressions of mirth or annoyance after its utterance. But sometimes we can stop such temporary recurring utterances by telling the patient to say "I don't know," or whatever the phrase may have been. They often fail.

All the above superficially different phenomena are fundamentally like; they all show a reduction to a more automatic condition.

ON AFFECTIONS OF SPEECH FROM DISEASE OF THE BRAIN.

[Brain, 1879, vol. i, p. 304.]

It is very difficult for many reasons to write on affections of speech. So much, since the memorable researches of Dax and Broca, has been done in the investigation of these cases of disease of the brain, that there is an *embarras de richesse* in material. To refer only to what has been done in this country, we have the names of Gairdner, Moxon, Broadbent, William Ogle, Bastian, John W. Ogle, Thomas Watson, Alexander Robertson, Ireland, Wilks, Bristowe, Ferrier, Bateman, and others. To Wilks, Gairdner, Moxon, Broadbent, and Ferrier, I feel under great obligations. Besides recognizing the value of Broadbent's work on this subject, I have to acknowledge a particular indebtedness to him. Broadbent's hypothesis, a verified hypothesis, is, I think, essential to the methodical investigation of affections of speech. Let me give at once an illustration of its value. It disposes of the difficulty there otherwise would be in holding (1) that loss of speech is, on the physical side, loss of nervous arrangements for highly special and complex articulatory *movements*, and (2) that in cases of loss of speech the articulatory *muscles* are not paralysed, or but slightly paralysed. I shall assume that the reader is well acquainted with Broadbent's researches on the representation of certain movements of the two sides of the body in each side of the brain; the reader must not assume that Broadbent endorses the applications I make of his hypothesis. The recent encyclopædic article on Affections of Speech, by Kussmaul, in Ziemssen's "Practice of Medicine," is very complete and highly original. It is worthy of most careful study.

The subject has so many sides—psychological, anatomical, physiological, and pathological—that it is very difficult to fix on an order of exposition. It will not do to consider affections of speech on but one of these sides. To show how they mutually bear, we must see each distinctly. For example, we must not confound the physiology of a case with its pathology, by using for either the vague term "disease." Again,

we must not ignore anatomy when speaking of the physical basis of words, being content with morphology, as in saying that words "reside" in this or that part of the brain. Supposing we could be certain that this or that grouping of cells and nerve-fibres was concerned in speech, from its being always destroyed when speech is lost, we should still have to find out the anatomy of the centre. Even supposing we were sure that the psychical states called words, and the nervous states in the "centre for words," were the same things, we should still have the anatomy of that centre to consider. The morphology of a centre deals with its shape, with its "geographical" position, with the sizes and shapes of its constituent elements. A knowledge of the anatomy of a centre is a knowledge of the parts of the body represented in it, and of the ways in which these parts are therein represented. Whilst so much has been learned as to the morphology of the cerebrum—cerebral topography—it is chiefly to the recent researches of Hitzig and Ferrier that we are indebted for our knowledge of the anatomy of many of the convolutions, that is, a knowledge of the parts of the body these convolutions represent. It is supposed that the anatomy of the parts of the brain concerned with words is that they are cerebral nervous arrangements representing the articulatory muscles in very special and complex movements. Similarly, a knowledge of the anatomy of the centres concerned during visual ideation is a knowledge of those regions of the brain where certain parts of the organism (retina and ocular muscles) are represented in particular and complex combinations. A merely materialistic or morphological explanation of speech or mind, supposing one could be given, is not an anatomical explanation. Morphologically, the substratum of a word or of a syllable is made up of nerve-cells and fibres; anatomically speaking, we say it is made up of nerve-cells and fibres representing some particular articulatory movement.

Unless we most carefully distinguish betwixt psychology and the anatomy and physiology of the nervous system in this inquiry, we shall not see the fundamental similarity there is betwixt the defect often described in psychological phraseology as "loss of memory for words," and the defect called ataxy of articulation. A method which is founded on classifications which are partly anatomical and physiological, and partly psychological, confuses the real issues. These mixed classifications lead to the use of such expressions as that an *idea* of a word produces an articulatory *movement*: whereas a psychical state, an "idea of a word" (or simply "a word") cannot produce an articu-

latory movement, a physical state. On any view whatever as to the relation of mental states and nervous states such expressions are not warrantable in a *medical* inquiry. We could only say that discharge of the cells and fibres of the anatomical substratum of a word produces the articulatory movement. In all our studies of diseases of the nervous system we must be on our guard against the fallacy that what are physical states in lower centres fine away *into* psychical states in higher centres; that, for example, vibrations of sensory nerves *become* sensations, or that somehow or another an idea produces a movement.

Keeping them distinct, we must consider now one and now another of the several sides of our subject; sometimes, for example, we consider the psychical side—speech—and at other times the anatomical basis of speech. We cannot go right on with the psychology, nor with the anatomy, nor with the pathology of our subject. We must consider now one and now the other, endeavouring to trace a correspondence betwixt them.

I do not believe it to be possible for anyone to write methodically on these cases of disease of the nervous system without considering them in relation to other kinds of nervous disease; nor to be desirable in a medical writer if it were possible. Broadbent's hypothesis is exemplified in cases of epilepsy and hemiplegia, as well as in cases of affections of speech, and can only be vividly realized when these several diseases have been carefully studied. Speech and perception ("words" and "images") co-operate so intimately in mentation (to use Metcalfe-Johnson's term) that the latter process must be considered. We must speak briefly of imperception, loss of images, as well as of loss of speech —loss of symbols. The same general principle is, I think, displayed in each. Both in delirium (partial imperception) and in affections of speech the patient is reduced to a more automatic condition; respectively reduced to the more organized relations of images and words. Again, we have temporary loss or defect of speech after certain epileptiform seizures; temporary affections of speech after these seizures are of great value in elucidating some difficult parts of our subject, and cannot be understood without a good knowledge of various other kinds of epileptic and epileptiform paroxysms, and post-paroxysmal states. After a convulsion beginning in the (right) side of the face or tongue, or in both these parts, there often remains temporary speechlessness, although the articulatory muscles move well. Surely we ought to consider cases of discharge of the centres for words as well as cases in

which these centres are destroyed, just as we consider not only hemiplegia but hemispasm. Before trying to analyse that very difficult symptom called ataxy of articulation, we should try to understand the more easily studied disorder of co-ordination, locomotor ataxy, and before that, the least difficult disorder of co-ordination of movements resulting from ocular paralysis. Unless we do, we shall not successfully combat the notion that there are centres for co-ordination of words which are something over and above centres for special and complex movements of the articulatory muscles, and that a patient can, from lesion of such a centre, have a loss of co-ordination, without veritable loss of some of the movements represented in it.

It might seem that we could consider cases of aphasia, as a set of symptoms at least, without regard to the pathology of different cases of nervous disease. We really could not. It so happens that different morbid processes have what, for brevity, we may metaphorically call different seats of election; thus, that defect of speech with which there are frequent mistakes in words is nearly always produced by local cerebral softening; that defect which is called ataxy of articulation, is, I think, most often produced by hæmorrhage. Hence we must consider hemiplegia in relation to affections of speech; for it so happens that the first kind of defect mostly occurs, as Hammond has pointed out, without hemiplegia, or without persistent hemiplegia, a state of things producible by embolism and thrombosis, and the latter mostly with hemiplegia and persistent hemiplegia, a state of things usually produced by hæmorrhage. From ignoring such considerations, the two kinds of defects are by some considered to be absolutely different, whereas on the anatomico-physiological side they are but very different degrees of one kind of defect.

There are certain general principles which apply not only to affections of speech, but also to the commonest variety of paralysis, to the simplest of convulsive seizures, and to cases of insanity.

The facts that the speechless patient is frequently reduced to the use of the most general propositions "yes" or "no," or both; that he may be unable to say "no" when told, although he says it readily in reply to questions requiring dissent; that he may be able ordinarily to put out his tongue well, as for example to catch a stray crumb, and yet unable to put it out when he tries, after being asked to do so; that he loses intellectual language and not emotional language; that although he does not speak, he understands what we say to him; and many other facts of the same order illustrate exactly the same principles as

do such facts from other cases of disease of the nervous system as that in hemiplegia the arm suffers more than the leg; that most convulsions beginning unilaterally begin in the index-finger and thumb; that in cases of post-epileptic insanity there are degrees of temporary reduction from the least towards the most "organized actions," degrees proportional to the severity of the discharge in the paroxysm, or rather to the amount of exhaustion of the highest centres produced by the discharge causing the paroxysm. In all these cases, except in the instance of convulsion, which, however, illustrates the principle in another way, there are, negatively, degrees of loss of the most voluntary processes with, positively, conservation of the next most voluntary or next more automatic; otherwise put, there are degrees of loss of the latest acquirements with conservation of the earlier, especially of the inherited acquirements. Speaking of the physical side, there are degrees of loss of function of the least organized nervous arrangements with conservation of function of the more organized. There is in each reduction to a more automatic condition; in each there is dissolution, using this term as Spencer does, as the opposite of evolution.[1]

In *defects* of speech we may find that the patient utters instead of the word intended a word of the same class in meaning, as "worm-powder" for "cough-medicine," or in sound, as "parasol" for "castor oil." The presumption is that the patient uses what is to him a more "organized" or "earlier" word, and if so, dissolution is again seen. But often there is no obvious relation of any sort betwixt the word said and the one appropriate, and thus the mistake does not appear to come under dissolution. If, however, we apply the broad principles which we can, I think, establish from other cases of dissolution—viz., from degrees of insanity, especially the slight degrees of the post-epileptic insanity just spoken of—we shall be able to show that many of the apparently random mistakes in words are not real exceptions to the principle of dissolution.

For the above reasons I shall make frequent references to other classes of nervous disease. The subject is already complex without these excursions, but we must face the complexity. Dr. Curnow has

[1] Here I must acknowledge my great indebtedness to Spencer. The facts stated in the text seem to me to be illustrations from actual cases of disease, of conclusions he has arrived at deductively in his "Psychology." It is not affirmed that we have the exact opposite of evolution from the apparently brutal doings of disease; the proper opposite is seen in healthy senescence, as Spencer has shown. But from diseases there is, in general, the corresponding opposite of evolution.

well said (*Medical Times and Gazette*, November 29, 1873, p. 616), "The tendency to appear exact by disregarding the complexity of the factors is the old failing in our medical history."

Certain provisional divisions of our subject must be made. The reader is asked to bear in mind that these are admittedly arbitrary; they are not put forward as scientific distinctions. Divisions[1] and arrangements are easy. Distinctions and classifications are difficult. But in the study of a very complex matter we must first divide and then distinguish. This is not contradictory to what was said before on the necessity of encountering the full complexity of our subject. Harm comes, not from dividing and arranging, but from stopping in this stage, from taking provisional divisions to be real distinctions, and putting forward elaborate arrangements, with divisions and subdivisions, as being classifications. In other words we shall, to start with, consider our subject empirically, and afterwards scientifically. We first arbitrarily divide and arrange for convenience of obtaining the main facts which particular cases supply, and then try to classify the facts, in order to show their true relations one to another, and consider them on the psychical side as defects of mind, and on the physical side as defects of the nervous system. Empirically we consider the cases of affection of speech we meet with, as they *approach* certain nosological types (most frequently occurring cases); scientifically we classify the facts thus obtained, to show how affections of speech are *departures from* what we know of healthy states of mind and body. The latter study is of the cases as they show different degrees of nervous dissolution.

Let us first of all make a very rough popular division. When a person "talks" there are three things going on, speech, articulation, and voice. Disease can separate them. Thus from disease of the larynx, or from paralysis of its nerves, we have loss of voice, but articulation and speech remain good. Again, in complete paralysis of the tongue, lips, and palate, articulation is lost, but speech is not even impaired; the

[1] "How often would controversies be sweetened were people to remember that 'distinctions and divisions are very different things,' and that 'one of them is the most necessary and conducive to true knowledge that can be; the other, *when made too much of*, serves only to puzzle and confuse the understanding.' Locke's words are the germ of that wise aphorism of Coleridge: 'It is a dull or obtuse mind that must divide in order to distinguish; but it is a still worse that distinguishes in order to divide.' And if we cast our eyes back over time, it is the same spirit as that which led Anaxagoras to say, 'Things in this one connected world are not cut off from one another as if with a hatchet.'" [*Westminster Review* (art Locke), January, 1877 (no italics in original).]

patient remains able to express himself in writing, which shows that he retains speech—internal speech—that he propositionizes well. Lastly, in extensive disease in a certain region in one half of the brain (left half usually) there is loss of speech, internal and external, but the articulatory muscles move well.

Let us make a wider division. Using the term "language" we make two divisions of it, intellectual and emotional. The patient, whom we call speechless (he is also defective in pantomime), has lost intellectual language and has not lost emotional language.

The kind of case we shall consider first is that of a man who has lost speech and whose pantomime is impaired, but whose articulatory muscles move well, whose vocal organs are sound, and whose emotional manifestations are unaffected. This is the kind of case to be spoken of as No. 2 (p. 116).

The term "aphasia" has been given to affections of speech by Trousseau; it is used for defects as well as for loss of speech. I think the expression affections of speech (including defects and loss) is preferable. Neither term is very good, for there is, at least in many cases, more than loss of *speech*; pantomime is impaired; there is often a loss or defect in symbolizing relations of things in any way. Dr. Hamilton proposes the term "asemasia," which seems a good one. He derives it from "ἀ, and, σημαίνω, an inability to indicate by signs or language." It is too late, I fear, to displace the word aphasia. Aphasia will be sometimes used as synonymous with affections of speech in this article.

We must at once say briefly what we mean by speech, in addition to what has been said by implication when excluding articulation, as this is popularly understood, and voice. To speak is not simply to utter words, it is to propositionize. A proposition is such a relation of words that it makes one new meaning; not by a mere addition of what we call the separate meanings of the several words; the terms in a proposition are modified by each other. Single words are meaningless, and so is any unrelated succession of words. The unit of speech is a proposition. A single word is, or is in effect, a proposition, if other words in relation are implied. The English tourist at a French *table d'hôte* was understood by the waiter to be asking for water when his neighbours thought he was crying "oh" from distress. It is from the use of a word that we judge of its propositional value. The words "yes" and "no" are propositions, but only when used for assent and dissent; they are used by healthy people interjectionally as well as

propositionally. A speechless patient may retain the word "no," and yet have only the interjectional or emotional, not the propositional use of it; he utters it in various tones as signs of feeling only. He may have a propositional use of it, but yet a use of it short of that healthy people have, being able to reply "no" but not to say "no" when told; a speechless patient may have the full use of it. On the other hand, elaborate oaths, in spite of their propositional structure, are not propositions, for they have not, either in the mind of the utterer or in that of the person to whom they are uttered, any meaning at all; they may be called "dead propositions." The speechless patient may occasionally swear. Indeed he may have a recurring utterance, e.g. "Come on to me," which is propositional in structure but not, to him, propositional in use; he utters it on any occasion, or rather on no *occasion*, but every time he tries to speak.

Loss of speech is, therefore, the loss of power to propositionize. It is not only loss of power to propositionize aloud (to talk), but to propositionize either internally or externally, and it may exist when the patient remains able to utter some few words. We do not mean by using the popular term "power" that the speechless man has lost any "faculty" of speech or propositionizing; he has lost those words which serve in speech, the nervous arrangements for them being destroyed. There is no "faculty" or "power" of speech apart from words revived or revivable in propositions, any more than there is a "faculty" of co-ordination of movements apart from movements represented in particular ways. We must here say, too, that besides the use of words in speech there is a service of words which is not speech; hence we do not use the expression that the speechless man has lost words, but that he has lost those words which serve in speech. In brief, speechlessness does not mean entire wordlessness.

It is well to insist again that speech and words are psychical terms; words have, of course, anatomical substrata or bases as other psychical states have. We must as carefully distinguish betwixt words and their physical bases as we do betwixt colour and its physical basis; a psychical state is always accompanied by a physical state, but nevertheless the two things have distinct natures. Hence we must not say that the "memory of words" is a *function* of any part of the nervous system, for function is a physiological term (*vide infra*). Memory or any other psychical state arises *during* not *from*—if "from" implies continuity of a psychical state with a physical state—functioning of nervous arrangements, which functioning is a

purely physical thing—a discharge of nervous elements representing some impressions and movements. Hence it is not to be inferred from the rough division we have just made of the elements of "talking," and from what is said of their "separation" by disease, that there is anything in common even for reasonable contrast, much less for comparison, betwixt loss of speech (psychical loss) and immobility of the articulatory muscles from, say disease of the medulla oblongata, as in "bulbar paralysis" (a physical loss). As before said, we must not classify on a mixed method of anatomy, physiology, and psychology, any more than we should classify plants on a mixed natural and empirical method, as exogens, kitchen-herbs, graminaceæ, and shrubs. The things comparable and contrastable in a rough division are (1) the two physical losses: (*a*) loss of function of certain nervous arrangements in the cerebrum, which are not speech (words used in speech), but the anatomical substrata of speech and (*b*) loss of function of nervous arrangements in the medulla oblongata. (2) The comparison, on the psychical side, fails. There is no psychical loss in disease of the medulla oblongata to compare with loss of words, as this part of the nervous system, at least as most suppose,[1] has no psychical side; there is nothing psychical to be lost when nervous arrangements in the medulla oblongata are destroyed.

The affections of speech met with are very different in degree and kind, for the simple reason that the exact position of disease in the brain and its gravity differ in different cases; different amounts of nervous arrangements in different positions are destroyed with different rapidity in different persons. There is, then, no single well-defined "entity"—loss of speech or aphasia—and thus, to state the matter for a particular practical purpose, such a question as, "Can an aphasic make a will?" cannot be answered any more than the question, "Will a piece of string reach across this room?" can be answered. The question should be, "Can this or that aphasic person make a will?" Indeed, we have to consider degrees of affection of language, of which speech is but a part. Admitting the occurrence of numerous degrees of affection of language, we must make arbitrary divisions for the first part of our inquiry, which is an empirical one.

Let us divide roughly into three degrees: (1) *Defect of speech.*—

[1] I, however, believe, as Lewes does, that in so far as we are physically alive we are psychically alive: that some psychical state attends every condition of activity of every part of the organism. This is, at any rate, a convenient hypothesis in the study of diseases of the nervous system.

The patient has a full vocabulary, but makes mistakes in words, as saying "orange" for "onion," "chair" for "table"; or he used approximative or quasi-metaphorical expressions, as "Light the fire up there" for "Light the gas." "When the warm water comes, the weather will go away," for "When the sun comes out, the fog will go away." (2) *Loss of speech.*—The patient is practically speechless, and his pantomime is impaired. (3) *Loss of language.*—Besides being speechless, he has altogether lost pantomime, and emotional language is deeply involved.

To start with, we take the simplest case, one of *loss of speech*, No. 2 ("complete aphasia"). Cases of defect of speech (1) are far too difficult to begin with, and so, too, are those cases (3) in which there is not only loss of speech, but also deep involvement of the least special part of language which we call emotional language. Moreover, we shall deal with a case of permanent speechlessness. I admit that making but three degrees of affection of language, and taking for consideration one kind of frequently occurring case, is an entirely arbitrary proceeding, since there actually occur very numerous degrees of affection of language, many slighter than, and some severer than, that degree (No. 2) we here call one of loss of speech. But, as aforesaid, we must study subjects so complex as this empirically before we study them scientifically; and for the former kind of study we must have what are called "definitions" by type, and state exceptions. This is the plan adopted in every work on the practice of medicine with regard to all diseases. Let us give an example of the twofold study: Empirically or clinically, that is for the art of medicine, we should consider particular cases of epilepsy, as each *approaches this or that nosological type* ("le petit mal, le grand mal," &c.). For the science of medicine we should, so far as is possible, consider cases of epilepsy, as each is dependent on a "discharging lesion" of this or that part of the cortex cerebri, and thus as it is a *departure from healthy states* of this or that part of the organism. We cannot do the latter fully yet, but the anatomico-physiological researches of Hitzig and Ferrier have marvellously helped us in this way of studying epilepsies, as also have the clinical researches of Broadbent, Charcot, Duret, Carville, and others.[1]

[1] See Moxon, "On the Necessity for a Clinical Nomenclature of Disease," *Guy's Hospital Reports*, 1870, vol. xv, p. 479. In this paper Moxon shows conclusively the necessity of keeping the clinical, or what is above called empirical—not using that term in its popular bad signification—and scientific studies of disease distinct. After reading this paper, my eyes were opened to the confusion which results from mixing the two kinds of study. It is particu-

The following are brief and dogmatic statements about a condition which is a common one—the kind of one we call loss of speech, our second degree (No. 2) of affection of language. The statements are about two equally important things: (1) of what the patient has lost in language—his negative condition—and (2) of what he retains of language—his positive condition. Here, again, is an illustration of a general principle which is exemplified in many, if not in all, cases of nervous disease, and one of extreme importance, when they are scientifically considered as instances of nervous dissolution. We have already stated the duality of many symptomatic conditions in the remarks on p. 110. Without recognizing the two elements in all cases of affections of speech, we shall not be able to classify affections of speech methodically. If we do not recognize the duplex (negative and positive) condition, we cannot possibly trace a relation betwixt Nos. 1, 2, and 3 (p. 115). There can be no basis for comparison betwixt the wrong utterances in No. 1 and the non-utterances in Nos. 2 and 3—betwixt a positive and a negative condition—betwixt speech, however bad, and no speech. There is a negative and a positive condition in each degree; the comparison is of the three degrees of the negative element and the three degrees of the positive element; the negative and positive elements vary inversely. The condition of the patient No. 1, who made such mistakes as saying "chair" for "table" was duplex; (*a*) negatively in not saying "table," and (*b*) positively, in saying "chair" instead; there is in such a case *loss* of some speech, with *retention* of the rest of speech. Hence the term "defect of speech" applied to such a case is equivocal; it is often used as if the actual utterance was the *direct* result of the disease. The utterance is wrong in that the words of it do not fit the things intended to be indicated; but it is the best speech under the circumstances, and is owing to activity of healthy (except, perhaps, slightly unstable) nervous elements. The real, the primary, fault is in the nervous elements which do not act, which are destroyed, or are for the time *hors de combat*. If, then,

larly important to have both an empirical arrangement and a scientific classification of cases of insanity. An example of the former is the much criticized arrangement of Skae; the scientific classification of cases of insanity, like that of affections of speech, would be regarding them as instances of dissolution; the dissolution in insanity begins in the highest and most complex of all cerebral nervous arrangements, the dissolution causing affections of speech in a lower series. The one kind of classification is for diagnosis (for direct "practical purposes"), the other is for increase of knowledge, and is worthless for immediate practical purposes. The fault of some classifications of insanity is that they are mixed, partly empirical and partly scientific.

we compare No. 1 with No. 2, we compare the two negative conditions, the inability to say "table," &c. (the loss of some speech), in No. 1, with the loss of nearly all speech in No. 2, saying the latter is a greater degree of the former, and we compare the two positive conditions, the retention of inferior speech (the wrong utterances) in No. 1, with in No. 2 the retention of certain recurring utterances, and with the retention of emotional language, saying the latter is a minor or lower degree of language than the former. Unless we take note of the duplex condition in imperception (delirium and ordinary insanity) we shall not be able to trace a correspondence betwixt it and other nervous diseases. There are necessarily the two opposite conditions in all degrees of mental affections, from the slightest "confusion of thought" to dementia, unless the dementia be total.

The Patient's Negative Condition.

(1) *He does not speak.*—He can, the rule is, utter some jargon, or some word, or some phrase. With rare exceptions, the utterance continues the same in the same patient: we call these recurring utterances. The exceptions to the statement that he is speechless are two. (*a*) The recurring utterance may be "yes" or "no," or both. These words are propositions when used for assent or dissent, and they are so used by some patients who are for the rest entirely speechless. (*b*) There are occasional utterances. Under excitement the patient may swear; this is not speech, and is not exceptional; the oath means nothing; the patient cannot repeat it, he cannot *say* what he has just *uttered*. Sometimes, however, a patient, ordinarily speechless, may get out a phrase appropriate to some simple circumstance, such as "good-bye" when a friend is leaving. This is an exception, but yet only a partial exception; the utterance is not of high speech value;[1] he cannot *say* it again, cannot repeat it when entreated; it is inferior speech, little higher in value than swearing. However, sometimes a patient, ordinarily

[1] What is meant by an utterance of high speech value, and by inferior speech, will later on be stated more fully than has been just now stated by implication. When we cease dealing with our subject empirically and treat it scientifically, we hope to show that these so-called exceptions come in place under the principle of dissolution. We may now say that speech of high value, or superior speech, is new speech, not necessarily new words and possibly not new combinations of words; propositions symbolizing relations of images new to the speaker, as in carefully describing something novel. It is the *latest* propositionizing. By inferior speech is meant utterances like, "Very well," "I do not think so," ready fitted to very simple and common circumstances, the nervous arrangements for them being well organized.

speechless, may get out an utterance of high speech value; this is very rare indeed.

(2) *He cannot write.*—That is to say, he cannot express himself in writing. This is called agraphia (William Ogle). It is, I think, only evidence of the loss of speech, and might have been mentioned in the last paragraph. Written words are symbols of symbols. Since he cannot write, we see that the patient is speechless, not only in the popular sense of being unable to talk, but altogether so; he cannot speak internally. There is no fundamental difference betwixt external and internal speech; each is propositionizing. If I say "gold is yellow" to myself, or think it, the proposition is the same; the same symbols referring to the same images in the same relation as when I say it aloud. There is a difference, but it is one of degree; psychically "faint" and "vivid," physically "slight" and "strong" nervous discharges. The speechless patient does not write because he has no propositions to write. The speechless man may write in the sense of penmanship; in most cases he can copy writing, and can usually copy print into writing, and very frequently he can sign his name without copy. Moreover, he may write in a fashion without copy, making, or we may say drawing, a meaningless succession of letters, very often significantly the simplest letters, pothooks. His handwriting may be a very bad scrawl, for he may have to write with his left hand. His inability to write, in the sense of expressing himself, is loss of speech; his ability to make ("to draw") letters, as in copying, &c., shows that his "image series" (the materials of his perception) is not damaged.

Theoretically there is no reason why he should not write music without copy, supposing, of course, that he could have done that when well; the marks (artificial images) used in noting music, have no relation to words any way used. On this matter I have no observations. Trousseau writes in his lecture on Aphasia (*New Sydenham Society's Transactions*, vol. i, p. 270), "Dr. Lasegue knew a musician who was completely aphasic, and who could neither read nor write, and yet could note down a musical phrase sung in his presence."

(3) In most cases the speechless patient *cannot read at all*, obviously not aloud, but not to himself either, including what he has himself copied. We suppose our patient cannot read. This is not from lack of sight, nor is it from want of perception; his perception is not itself in fault, as we shall see shortly.

(4) His power of making signs is impaired (pantomimic propositionizing). We must most carefully distinguish pantomime from gesticulation. Throwing up the arms to signify "higher up," pantomime, differs from throwing the arms when surprised, gesticulation, as a proposition does from an oath.

So far we have, I think, only got two things, loss of speech (by simple direct evidence, and by the indirect evidence of non-writing and non-reading) and defect of pantomime. There are in some cases of loss of speech other inabilities: the most significant are that a patient cannot put out his tongue when he tries, or execute other movements he is told, when he can move the parts concerned in other ways quite well.

THE PATIENT'S POSITIVE CONDITION.

(1) He can understand what we say or read to him; he remembers tales read to him. This is important, for it proves that, although speechless, the patient is not wordless. The hypothesis is that words are in duplicate; and that the nervous arrangements for words used in speech lie chiefly in the left half of the brain; that the nervous arrangements for words used in understanding speech (and in other ways) lie in the right also. Hence our reason for having used such expressions as "words serving in speech"; for there is, we now see, another way in which they serve. When from disease in the left half of the brain speech is lost altogether, the patient understands all we say to him, at least on matters simple to him. Further, it is supposed that another use of the words which remain is the chief part of that service of words which in health precedes speech; there being an unconscious or subconscious revival of words in relation before that second revival which is speech. Coining a word, we may say that the process of verbalizing is dual; the second "half" of it being speech. It is supposed also that there is an unconscious or subconscious revival of relations of images, before that revival of images in relation which is perception.

(2) His articulatory organs move apparently well in eating, drinking, swallowing, and also in such utterances as remain always possible to him (recurring utterances), or in those which come out occasionally. Hence his speechlessness is not owing to disease of those centres in the medulla oblongata for immediately moving the articulatory muscles; for in other cases of nervous disease, when these centres are so damaged that the articulatory muscles are so much paralysed that *talking* is impossible, the patient remains able to *speak* (to propositionize) as well as ever; he has internal speech, and can write what he speaks.

The following dicta may be of use to beginners. Using the popular expression "talk," we may say that if a patient does not talk because his brain is diseased, he cannot write (express himself in writing), and can swallow well; if he cannot talk because his tongue, lips, and palate are immovable, he can write well and cannot swallow well.

(3) His vocal organs act apparently well; he may be able to sing.

(4) His emotional language is apparently unaffected. He smiles, laughs, frowns, and varies his voice properly. His recurring utterance comes out now in one tone and now in another, according as he is vexed, glad, &c.; strictly, we should say he sings his recurring utterance; variations of voice being rudimentary song (Spencer); he may be able to sing in the ordinary meaning of that term. As stated already, he may swear when excited, or get out more innocent interjections, simple or compound (acquired parts of emotional language). Although he may be unable to make any but the simplest signs, he gesticulates apparently as well as ever, and probably he does so more frequently and more copiously than he used to do. His gesticulation draws attention to his needing something, and his friends guess what it is. His friends often erroneously report their guessing what he wants when his emotional manifestations show that he is needing something, as his expressing what thing it is that he wants.

So far for the negative and positive conditions of language in our type case of loss of speech—No. 2 in defect of language.

Words are in themselves meaningless, they are only symbols of things or of "images" of things; they may be said to have meaning "behind them." A proposition symbolizes a particular relation of some images.[1]

We must, then, briefly consider the patient's condition in regard to the images symbolized by words. For although we artificially separate speech and perception, words and images co-operate intimately in most mentation. Moreover, there is a morbid condition in the image series (imperception), which corresponds to aphasia in the word series. The two should be studied in relation.

The speechless patient's perception (or "recognition," or "thinking"

[1] The term "image" is used in a psychical sense, as the term "word" is. It does not mean "visual" images only, but covers all mental states which represent things. Thus we speak of auditory images. I believe this is the way in which Taine uses the term "image." What is here called "an image" is sometimes spoken of as "a perception." In this article the term "perception" is used for a *process*, for a "proposition of images," as speech is used for propositions, i.e., particular inter-relations of words. The expression "organized image" is used briefly for "image," the *nervous arrangements for which* are "organized" correspondingly for "organized word," &c.

of things) (propositions of images) is unaffected, at any rate as regards simple matters. To give examples: He will point to any object he knew before his illness which we name; he recognizes drawings of all objects he knew before his illness. He continues able to play at cards or dominoes; he recognizes handwriting, although he cannot read the words written; he knows poetry from prose, by the different endings of the lines on the right side of the page. One of my patients found out the continuation of a series of papers in a magazine volume, and had the right page ready for her husband when he returned from his work; yet she, since her illness, could not read a word herself, nor point to a letter nor could she point to a figure on the clock. There is better and simpler evidence than that just adduced that the image series is unaffected; the foregoing is intended to show that the inability to read is not due to loss of perception nor to non-recognition of letters, &c., as particular marks or drawings, but to loss of speech. Written or printed words cease to be symbols of words used in speech for the simple reason that those words no longer exist to be symbolized; the written or printed words are left as symbols of nothing, as mere odd drawings. The simplest example showing the image series to be undamaged is that the patient finds his way about; this requires preconception, that is, "propositions of images" of streets, &c. Moreover, the patient can, if he retains the propositional use of "yes" and "no," or if he has the equivalent pantomimic symbols, intelligently assent or dissent to simple statements, as that "racehorses are the swiftest horses," showing that he retains organized nervous arrangements for the images of the things "swiftness" and "horse"; this has already been implied when it was asserted that he understands what we say to him, a process requiring not some of his words only, but also some of his "images" of things, of which the words are but symbols.

Such facts as the above are sometimes adduced as showing that the patient's "memory" is unaffected. That expression is misleading, if it implies that there is a general faculty of memory. There is no faculty of memory apart from things being remembered; apart from having, that is, now and again, these or those words, or images, or actions (faintly or vividly). We may say he has not lost the memory of images, or better, that he has the images actually or potentially, the nervous arrangements being intact and capable of excitation did stimuli come to them; we may say that he has lost the memory of those words which serve in speech. It is better, however, to use the simple expression that he has not lost images, and that he has lost the words used in speech.

These facts as to retention of images are important as regards the writing of speechless patients. The printed or written letters and words are images, but they differ from the images of objects, in being artificial and arbitrary, in being acquired later; they are acquired after speech and have their meaning only through speech; written words are symbols of images. The aphasic patient cannot express himself in writing because he cannot speak; but the nervous arrangements for those arbitrary images which are named letters are intact, and thus he can reproduce them as mere drawings, as he can other images, although with more difficulty, they, besides lacking their accustomed stimulus, being less organized. He can copy writing, and he can copy print into writing. When he copies print into writing, obviously he derives the images of letters from his own mind (physically his own organization). He does not write in the sense of expressing himself, because there are no words reproduced in speech to express. That series of artificial images which make up the signature of one's name has become almost as fully organized as many ordinary images; hence in many cases the speechless man who can write nothing else without copy can sign his name.

For the perception (or recognition or thinking) of things, at least in simple relations, speech is not necessary, for such thought remains to the speechless man. Words are required for thinking, for most of our thinking at least, but the speechless man is not wordless; there is an automatic and unconscious[1] or subconscious service of words.

It is not, of course, said that speech is not required for thinking on novel and complex subjects, for ordinary images in new and complex relations (i.e., to the person concerned), and thus the process of perception in the speechless, but not wordless, man may be defective in the sense of being inferior from lack of co-operation of speech; it is not itself in fault, it is left unaided.

[1] The expression "unconscious reproduction of words," involves the same contradiction as does the expression, "unconscious sensation." Such expressions may be taken to mean that energizing of lower, more organized, nervous arrangements, although unattended by any sort of conscious state, is essential for, and leads to, particular energizings of the highest and least organized—the now organizing nervous arrangements, which last-mentioned energizing is attended by consciousness. I, however, think (as Lewes does) that some consciousness or "sensibility" attends energizing of all nervous arrangements (I use the term "subconscious" for slight consciousness). In cases where from disease the highest nervous arrangements are suddenly placed *hors de combat*, as in sudden delirium, the next lower spring into greater activity, and then, what in health was a subordinate subconsciousness, becomes a vivid consciousness, and is also the highest consciousness there then can be.

To understand anything novel and complex said to him, the healthy man speaks it to himself, e.g., repeats, often aloud, complex directions of route given to him.

The word "thing" has not been used as merely synonymous with "substance"; nor is it meant that anybody has nervous arrangements for the images of "swiftness" and "horse," but only for images of some swiftly moving thing or things, and for images of some particular horse or horses.

It may be well here to give a brief recapitulation of some parts of our subject and, also very briefly, an anticipation of what is to come; the latter is given partly as an excuse for having dwelt in the foregoing on some points not commonly considered in such an inquiry as this, and partly to render clearer some matters which were only incidentally referred to.

The division into internal and external speech (see p. 119) is not that just made into the dual service of words. Internal and external speech differ in degree only. Such a difference is insignificant in comparison with that betwixt the prior unconscious, or subconscious, and automatic reproduction of words and the sequent conscious and voluntary reproduction of words; the latter alone is speech, either internal or external. Whether I can show that there is this kind of duality or not, it remains certain that our patient retains a service of words, and yet ordinarily uses none in speech. The retention of that service of words which is not a speech use of words, is sometimes spoken of as a retention of "memory of" words, or of "ideas of" words. But as there is no memory or idea of words apart from having words, actually or potentially, it is better to say that the patient retains words serving in other ways than in speech; we should say of his speechlessness, not that he has lost the memory of words, but simply that he has lost those words which serve in speech.

When we consider more fully the duality of the verbalizing process, of which the second "half" is speech, we shall try to show that there is a duality also in the revival of the images symbolized; that perception is the termination of a stage beginning by the unconscious or subconscious revival of images which are in effect "image symbols"; that we think not only by aid of these symbols, ordinarily so-called (words), but by aid of symbol-images. It is, I think, because speech and perception are preceded by an unconscious or subconscious reproduction of words and images, that we seem to have "faculties" of speech and of perception, as it were, above and independent of the rest of ourselves.

We seem to have a memory or ideas [1] of words *and* words; having really the two kinds of service of words. The evidence of disease shows, it is supposed, that the highest mentation arises out of our whole organized states, out of ourselves, that will, memory, &c., "come from below," and do not stand autocratically "above," governing the mind; they are simply the now highest, or latest, state of our whole selves. In simple cases of delirium (partial imperception with inferior perception) as when a patient takes his nurse to be his wife, we find, I think, a going down to and a revelation of what would have been when he was sane, the lower and earlier step towards his true recognition or perception of the nurse.

The first step towards his recognition of her when he was sane would be the unconscious or subconscious, and automatic reproduction of his, or of one of his, well-organized symbol-images of woman; the one most or much organized in him would be his wife. To say what a thing is, is to say what it is like; he would not have known the nurse even as a woman, unless he had already an organized image of at least one woman. The popular notion is, that by a sort of faculty of perception, he would recognize her without a prior stage in which, he being passive, an organized image was roused in him by the mere presence of the nurse; the popular notion almost seems to imply the contradiction that he first sees her, in the sense of recognizing her, and then sees her as like his already acquired or organized image of some woman. We seem to ourselves to perceive, as also to will and to remember, without prior stages, because these prior stages are unconscious or subconscious. It seems to me that in delirium the patient is reduced to conditions which are revelations of, or of parts of, the lower earlier and prior stages; the lower or earlier stages are then conscious. They are the *then* highest or *latest* conscious states. When the patient becomes delirious, he takes the nurse to be his wife. More or fewer of the highest nervous arrangements being then exhausted, the final stage is not possible. There is only the first stage; the reproduction of his well-organized symbol-image is all there is, and that is all the nurse can be to him; she is, to him, his wife. The symbol-image is then vividly reproduced because the centres next lower than those exhausted are in abnormally great activity (note that there are two conditions,

[1] The so-called *idea* of a word, in contradistinction to *the* word, is itself a word subconsciously revived, or revivable, before the conscious revival or revivability of the same word, which latter, in contradistinction to the so-called *idea* of a word, is the so-called *word itself*—*the* word.

one negative and the other positive). There is a deepening of consciousness in the sense of going down to lower earlier and more organized states, which in health are mostly unconscious or subconscious, and precede higher or later conscious states; in other words, with loss with or defect of object consciousness, even in sleep dreaming, there is increasing subject consciousness; on the physical side, increasing energizing of those lower centres which are in the daytime more slightly energizing during that unbroken subconscious "dreaming," from which the serial states, constituting our latest or highest object consciousness, are the continual "awakenings."

It is supposed that the well-organized images spoken of, in effect arbitrary images, symbol-images, those which *become* vivid and are "uppermost" in delirium, and then cease to be mere symbols, constitute what seems to be a "general notion" or "abstract idea" of such things as "horse," "swiftness," &c.; their particularity (that they are only images of some horse or horses, of some swift moving thing or things) not appearing, because they are unconscious or subconscious; they served once as images of particular things, and at length as symbol-images of a class of images of things, as well as images of the particular things.

At p. 120 we spoke of the right half of the brain as being the part during the activity of which the most nearly unconscious and most automatic service of words begins, and of the left as the half during activity of which there is that sequent verbal action which is speech. The division is too abrupt; some speech—voluntary use of words—is, as we have seen when alluding to occasional utterances, possible to the man who is rendered practically speechless by disease in the left half. Again, from disease of the right half, there is not loss of that most automatic service of words which enables us to understand speech. The thing which it is important to show is, that mentation is dual, and that physically the unit of function of the nervous system is double the unit of composition; not that one-half of the brain is "automatic" and the other "voluntary."

Having now spoken of the kind of case we shall consider, and having added remarks, with the endeavour to show how the several symptoms—negative and positive—are related one to another, we shall be able to give reasons for excluding other kinds of cases of speechlessness.

We are not concerned with cases of all persons who do not speak. We shall not, for example, deal with those untrained deaf-mutes who

never had speech, but with the cases of those persons only who have had it, and lost it by disease. The condition of an untrained deaf-mute is in very little comparable with that of our arbitrarily taken case of loss of speech. The deaf-mute's brain is not diseased, but, because he is deaf, it is uneducated (or in anatomical and physiological phraseology undeveloped) so as to serve in speech. Our speechless patient is not deaf. Part of our speechless patient's brain is destroyed; he has *lost* nervous arrangements which had been trained in speech. Moreover, our speechless man retains a service of words which is not speech; untrained deaf-mutes have no words at all. Further, the untrained deaf-mute has his natural system of signs, which to him is of speech value as far as it goes. He will think by aid of these symbols as we do by aid of words.[1] Our speechless patient is defective even in such slight pantomime as we may reasonably suppose to have been easy to him before his illness. The deaf-mute may have acquired for talking and thinking the common arbitrary system of deaf-mute signs (finger-talk), or he may have been taught by the new method to speak as we do, and thus have ceased to be mute. But when not taught to speak, he is not in a condition even roughly comparable with that of a man who has *lost* speech. No doubt by disease of some part of his brain the deaf-mute might lose his natural system of signs, which are of some speech value to him, but he could not lose speech, having never had it. Much more like our speechless patient's condition is that of the little child which has been taught to understand speech, and has not yet spoken.

There is another set of cases of so-called loss of speech, which we shall not consider as real loss of speech. I prefer to say that these patients *do* not speak: cases of some persons are meant, who do not talk and yet write perfectly. This may seem to be an arbitrary exclusion. There is in most of these cases an association of symptoms, which never arises from any local disease of any part of the nervous system; the so-called association is a mere jumble of symptoms. Let us state the facts. The patients are nearly always boys or unmarried women. The bearing of this is obvious. The so-called loss of speech is a total non-utterance, whereas it is an excessively rare thing for

[1] We must not confound the finger-talk with the "natural" system of signs. They are essentially different. No one supposes that words are essential for thought, but only that some symbols are essential for conceptual thought, although it may be that people with "natural" symbols do not reach that higher degree of abstract thinking which people do who have words.

a patient who does not speak, because his brain is locally diseased, to have no utterance whatever; I do not remember seeing one such case in which there was not some utterance (recurring utterance) a few days or a few weeks after the onset of the illness; the absolute pseudo-speechlessness may remain for months. They cannot be mute from paralysis of the articulatory muscle, because they swallow well. Frequently there is loss of voice also—they get out no sounds except, perhaps, grunts, &c.—and yet they cough ringingly and breathe without hoarseness or stridor; there is no evidence of laryngeal disease. Now loss of voice never occurs with loss of speech from local disease of one side of the brain. No disease of the larynx would cause loss of speech or loss of articulation. The patients often "lose" their speech after calamity or worry. In these cases there is no hemiplegia and no other one-sided condition from first to last. They often, after months of not speaking, recover absolutely and immediately after some treatment which can have no therapeutical effect, e.g., a liniment rubbed on the back, a single faradaic stimulation of the vocal cords or of the neck. Dr. Wilks has reported a case of "cure" of a girl who had not spoken for months; she had also "lost" the use of her legs. Knowing well what was the general nature of the case, Dr. Wilks, by speaking kindly to her, and giving her an excuse for recovery in the application of faradization, got her well in a fortnight. Sometimes the so-called speechless patient speaks inadvertently when suddenly asked a question, and then goes on talking; is well again. Sometimes speech is surprised out of her. Thus a woman, whose case is recorded by Durham, when told to cry "Ah!" when the spatula was holding down her tongue, pushed his hand away, saying, "How can I, with that thing in my mouth?" She then said, "Oh! I have spoken." She was "cured." I believe that patients, "speechless" as described, might be "cured" by faradization of the vocal cords, or by a thunderstorm, or by quack medicines or appliances, or by mesmerism, or by wearing a charm, or —not speaking flippantly—by being "prayed over."

Sometimes these cases are spoken of as cases of "emotional aphasia" —the speechlessness is said to be "caused by" emotional excitement, because it often comes on *after* emotional disturbance.

I submit that the facts that the patients do not talk and *do* write and *do* swallow are enough to show that there is no disease at all, in any sense except that the patients are hysterical (which is saying nothing explanatory), or that they are pretending. There can be no *local* disease, at any rate.

These cases are spoken of at length, although they are excluded, because they are sometimes adduced as instances of aphasia, or loss of speech proper, with ability to write remaining. I confess that were I brought face to face with a man whom I believed to *have* local disease of his brain, who did not *talk*, and yet wrote well, I should conclude that he did *speak* internally although he could not talk. To say that *he* cannot speak, and yet can express himself in writing is equivalent, I think, to saying *he* cannot speak and yet *he* can speak.

———

ON AFFECTIONS OF SPEECH FROM DISEASE OF THE BRAIN.

[BRAIN, 1880, vol. ii, p. 203.]

IN the first[1] instalment of this article it was pointed out that there are necessarily numerous degrees and kinds of affection of language, since "different amounts of nervous arrangements in different positions are destroyed with different rapidity in different persons." Moreover, cases are vastly different in their different stages; a patient may be quite speechless for a few days, and afterwards improve so as to have at length only slight defect of speech; and of course there are numerous cases of complete recovery. It is necessary to make some division of cases; we roughly made three groups. We were careful to declare that this division was an arbitrary one, that it was not a scientific distinction. The divisions usually made are arbitrary, too, although the nomenclature being in highly technical psychological and clinical terms, they may appear to the unwary as being real, almost natural, distinctions. As was then insisted on, we must in an empirical inquiry take type-cases; we follow the plan which is tacitly, if not avowedly, adopted in every work on the "Practice of Medicine" with regard to all diseases.

We took for first consideration the simplest group, cases of loss of speech (No. 2) p. 116; cases of defect of speech (No. 1), and that deeper

[1] I should like to remark that one very general conclusion to which the several facts so far stated, and facts afterwards to be stated, point, was in principle long ago formulated by M. Baillarger. So far back as 1866 [p. 53] I made the following quotations from his writings, which I now reproduce:—

"L'analyse des phénomènes conduit à reconnaître, dans certains cas de ce genre, que l'incitation verbale involontaire persiste, mais que l'incitation volontaire est abolie. Quant à la perversion de la faculté du langage caractérisée par la prononciation de mots incohérents, la lésion consiste encore dans la substitution de la parole automatique à l'incitation verbale volontaire."

I ought to have reproduced this quotation in the first instalment of this article, as evidently I am following pretty closely the principle this distinguished Frenchman has laid down. For the satisfaction of curious persons, I may say that I give it now spontaneously, no one having drawn my attention to the omission. I fear M. Baillarger's acute remarks have attracted little attention, and I say with regret that I had forgotten them. I do not remember from what book I took the quotation.

involvement of language in which emotional manifestations (No. 3) scarcely remain, are more difficult and will be considered later. We take the simple case for investigation first, just as, were we writing on hemiplegia, we should take first the simplest case of that paralysis, not the more difficult case, in which there are deep loss of consciousness and lateral deviation of the eyes and head, as well as paralysis of the face, tongue, arm, and leg. A patient who loses speech may regain it; it is convenient to consider cases of permanent speechlessness.

On pp. 116 *et seq.* we made some brief general statements as to the speechless patient's condition; we especially insisted on the necessity of recognizing a positive as well as a negative element. I feel convinced that unless in all degrees of affection of language we recognize that the symptomatic condition is duplex, we shall not trace relations betwixt them, and shall be misled into supposing that cases are different in kind when there are only differences of degree. We have remarked on this (p. 117). Further, we shall not be able to trace analogies betwixt these examples of dissolution beginning in the lower cerebral centres, and cases of dissolution beginning in the highest centres, that is to say, cases of insanity where the condition is manifestly duplex. The most important thing showing the duality of the speechless man's condition is given very generally by saying that speechlessness does not imply wordlessness. We stated that there is not evidence that the process of perception is damaged in itself; we say "in itself," admitting that perception may suffer from lack of co-operation of speech-use of words.

We have now to consider more particularly the condition of the patient we call speechless. In most cases there remains some utterance. But to utter words is not necessarily to speak. To speak is to propositionize. We admit, however, that in some cases which we call loss of speech there is a recurring utterance, viz., "yes" or "no," which is of propositional value; and that occasionally there occur utterances which are of propositional value, and are made up of several words. But in these cases the recurring utterances which have propositional value are so very general in their application, and the occasional utterances which have propositional value are so rare and usually also of so very general application, that it is almost pedantic to say the patients are not speechless. Nevertheless there are exceptions to our statement that there is *loss* of speech in the type case (No. 2) and full consideration will be given to them.

We divide the utterances into two classes, recurring and occasional.

(1) Recurring Utterances.

Soon after the attack there may be no sort of utterance. But almost always one comes in a few days or weeks. I used to call them "stock utterances." They are always utterable, and they alone remain with the exception of the rare occasional utterances. We make four divisions of recurring utterances.

(1) It is sometimes jargon. In one case it was "yabby," in another "watty." Sometimes there is a succession of different jargon; in one case, "Me, me committimy, pittymy, lor, deah." The patient utters his jargon at any time. If he *says* anything, it is always "yabby," or whatever his jargon may be: in reality he *says* nothing with these utterances; they have no propositional value whatever.

(2) Sometimes the utterance is, what to a healthy person is a word, as "man," "one," "awful," &c. Such a word is, for use, no better than jargon in the mouth of the speechless patient, it is not a word to him; "man" as a recurring utterance is not a symbol for a human being. The so-called word comes out, just as "yabby" does and means no more, means nothing. A single word might have, in a healthy person, propositional value. For example, were a person asked how many oranges he would buy, the reply "one" would be a proposition. But the speechless man's recurring "one" comes out whenever anything comes out, and applies to nothing at all.

Here, having given some examples, I may make one general remark about all kinds of recurring utterances. The rule is that the particular recurring utterance each person has at first never changes. Sometimes, however, but exceedingly rarely, it changes. A patient of mine, for some months when under my care in the London Hospital, could only utter the word "Dick." Later it changed to "Jimmy," with the variations of "Jin" and Jigger." Another general remark is that although these rags and tatters of what was once the patient's speech are of no use as speech, they serve as parts of emotional manifestations; it is rather, we should say, the tones in which they are uttered; it would be most correct to say the patient "sings" his recurring utterances—variations of tone with healthy speech being rudimentary singing (Spencer).

In this service of these as also in that of the other recurring utterances, we have evidence that emotional language is not affected.[1]

The way in which speechless recurring utterances serve patients

[1] I would not affirm that the finest emotional manifestations may not be lost in cases of loss of speech; I do not know that they are. It would be very remarkable if they were not.

is exemplified in some cases noted in the Hospital Reports of the *Lancet* [7], and [15]. Several other things of importance for other departments of our subject are given in the following extracts:—

"The patient we saw could only utter the word 'Dick' and this word he uttered whenever we asked him a question. We were told that when the man was vexed by the other patients in his ward he would swear. He generally used the common explosive sound so much in favour with English swearers. He could not, however, say the word when required to do so, even whilst it was well kept before his mind by frequent repetition. He seemed to make efforts to say it, but the word 'Dick' always came out instead. The oath was only uttered under the influence of emotion, and could never be repeated at will" (p. 43).

The following is a further note of the same case from the "Mirror" of the *Lancet*, July 20, 1867.

"When the poor fellow left the London Hospital he was able to utter the word 'Dick' only, except that he swore when vexed. He is now in a workhouse where Dr. Hughlings-Jackson saw him a few weeks ago. Strange to say, the patient's stock phrase is now 'Jimmy'; he never says 'Dick.' Although it is two years since the patient left the hospital, as soon as he saw the doctor he raised himself eagerly from his chair, offered his left hand—his right is still paralysed—and cried out very vivaciously, 'Jimmy, Jimmy,' &c., evidently pleased to see some one whom he knew. The ward superintendent says the patient sometimes sings; that the word he then uses is 'jigger.' He is usually quiet; but when vexed he swears, or rather utters a very nasty word, the last syllable of which rhymes to the last syllable of jigger.[1] He cannot say this word when he tries, but when trying, says 'Jim' instead. 'Jimmy' seems to be the word he uses as an ejaculation to show states of feeling, and 'Jim' when he is trying to convey information. When asked to show how many children he had, he extended his left five digits twice, and at each extension he uttered jerkingly the word 'Jim.' At a second visit, the man replied to the same question in the same way; but there are no means of knowing whether his reply is a correct one or not. He does not tell the number of days in the week by this plan. He sang when asked; and although the performance was of the very poorest kind, there was cadence with variation of tone. In one of these efforts he used as a vehicle of sound

[1] "Bugger."

the word 'Jim,' in another 'jigger.' The ward superintendent remarked that the man's friends had not visited him since Christmas. Here the patient clenched his fist, tightened his lips, face and neck, holding his breath, and turning red the while as if making an effort. After a moment or two he sighed deeply and relaxed, shook his head, and looked as if he had given up an attempt to do something. The attendant believed the patient was 'trying to talk,' and said he often saw him put himself in that way. As Dr. Hughlings-Jackson was leaving the room, the patient left by another door, but in passing through the doorway he stopped, and turned his head as if he had suddenly remembered something, looked towards the doctor, and said pleasantly, 'Jim, Jim.' It was supposed that this meant good-bye."

I may here mention that I did not get to know if the patient had sons of the name of Richard and James (*vide infra*).

The following is from the same "Mirror" of the *Lancet* as the last quotation. It shows a certain *use* of the jargon "ow," during the expression of number, as well as its use as the proposition "yes."

"In another workhouse Dr. Hughlings-Jackson saw a woman, aged 25, who is only able to utter the phrase 'Oh! my God!' and the noise 'ow,' probably a corruption of 'oh!' When the doctors went up to her bed and spoke to her, she cried out 'Oh! my God!' When next spoken to, she said 'Oh!' and then put her hand over her mouth. She uttered the phrase several times in the interview; but she 'spoke' with the syllable 'ow,' expressing assent or dissent by the tone she gave to it, and by her manner. She was asked how long it was after her confinement before the loss of speech came on. She held out her five left fingers, and said 'Ow,' and then separating one finger from the rest of those of the paralysed right hand, again said 'ow.' The doctors said interrogatively, 'Six?' She nodded, and said 'Ow.' They then asked whether weeks, months, or years, really themselves knowing the right time. By variation of tone of 'ow' by nodding and shaking the head, she expressed assent or dissent when the right or wrong period was named. She laughed heartily when something jocose was said, crying out 'Oh! my God!' When the death of her baby was mentioned, her eyes filled with tears. The nurse says the woman was once in her ward before, and then the words uttered were 'Oh! my goodness will!'"

(3) The recurring utterance is sometimes a phrase. In one case "Come on," or sometimes that patient uttered "Come on to me." In another case, just mentioned, it was "Oh! my God!" In another case, mentioned to me by Dr. Langdon Down, "Yes, but you know."

In some cases, as in the one first mentioned, the patient may utter "yes" or "no," or both, in addition to his recurring phrase (see 4). He has then the two sets of recurring utterances.

These phrases, which have propositional structure, have in the mouths of speechless patients no propositional function. They are not speech, being never used as speech; they are for use only compound jargon: they or their tones are at the best of interjectional value only. The man who uttered "Come on to me," uttered it on every occasion when he made a rejoinder to anything said to him.

(4) A common thing is that the patient retains as his sole utterance "yes" or "no," or both these words. Sometimes there is, in addition, some utterance of one of the other divisions. This must be carefully borne in mind. We shall consider the utterances "yes" and "no" at length. It is the most important part of the whole inquiry. The consideration of these and of some other fundamentally like phenomena will help us out of the empirical stage of divisions into the scientific one of distinctions.

To speak is, as has been said, to propositionize; many verbal utterances by the healthy are not speech. Now the words "yes" and "no" are propositions; indeed, to call them "words" is not to acknowledge their proper rank; "proposition words" might be a more correct expression. But they are not always propositions, are not always used for assent and dissent; and thus the term "word" is convenient, if not strictly accurate.

It does not matter what the philological history of the words may be; at any rate "yes" and "no" stand for propositions. They are propositions in effect; we can *say* with them. Nor must we limit ourselves to the very syllables "yes" and "no." One of my patients had the utterance "Eh," which was "yes" for him, and possibly was a corruption of his healthy "yes." Were we now dealing with the less special part of intellectual language, pantomime, we should admit nodding the head for assent and shaking the head for dissent to be pantomimic propositions. With the other recurring utterances (1), (2) and (3), the patient says nothing; they are a mere series of syllables; the so-called words and phrases (2 and 3) being intellectually dead. Is not there then in the utterance of "yes" and "no" a real exception to the statement that our patient is speechless?

An utterance is or is not a proposition according as it is used.

(*a*) The speechless patient may utter "yes" or "no," or both, in different tones, merely according as he is thus or thus excited. It is

then not a proposition, but an interjection, a mere vehicle for variations of voice, expressive of feeling. (*b*) He may have this service of the words and be able also to reply with them; the latter is a propositional use of them. (*c*) He may, in addition to (*a*) and (*b*), be able to say the words when told to say them.

(*a*) A speechless patient may utter "yes" and "no" without any sort of application. He may utter "yes" when he means "no," and "no" when he means "yes." He may nod when he utters "yes." He may affirm or deny by the less special language of pantomime when he cannot *use* for affirmation and denial the words of affirmation and denial which he can glibly utter. They are not, therefore, propositions to him. Nevertheless, this low degree of the utterances serves him. He utters "Yes," "yes," "yes," or "No," "no," "no," merrily, or he utters them sadly, when respectively glad or sorry. That is to say, although he has not the propositional use of "yes" and "no," there is that emotional service of them which other speechless patients have of their recurring jargon, words or phrase (1, 2, 3). His utterances of them in various tones are revelations to *us* of his varying emotional states. We must be careful not to give *such* utterances of "yes" and "no" the credit of being propositions. From the tones in which they are uttered, *we* may understand or guess how the patient is feeling; and with the conspiring aid of the then circumstances, we or his friends may often *infer* what he is thinking. But so we could by the tones in which the recurring jargon (1) or phrase (2) is uttered. Like smiles, they are, when so used, not signs for emotional states, but they are, or rather the tones of them are, *parts of* this or that emotional manifestation. On the other hand, if the patient who generally uttered "no" at random, *used* "no" in a particular tone, in order to signify that he dissented, it would be speech, or at any rate of speech value; and so it would be speech or of speech value if a speechless man used his jargon with the same intention. The woman who uttered "ow" could express assent or dissent by the different tone she gave to it (p. 134). The following is a striking case:—

I have seen a patient who nearly a year before had become rapidly apoplectic. On recovering from this condition, he uttered only "low," but soon he uttered "no," and when I saw him he had nearly recovered speech. His articulation was defective, but his wife could understand what he said, not merely guess his meaning, and I could nearly always do the same. He could express himself in writing, and could read. For the moment using popular language ("*without prejudice*"), he had

the mental power of speech, but had defect in the executive. But he very often uttered the word "no" when he meant "yes"; this is a very rare thing in the midst of so much recovery of speech. In reply to one of my questions, he uttered "No, no." His wife said he meant "yes"; he nodded. Later in our investigation he uttered "no"; but his medical attendant, alive to his misuse of that word, said, "Do you mean 'no'?" The patient showed that he did by re-uttering it in a ceremonious, slow, decided tone. Thus the patient *uttered* in a tone to signify dissent, the word which, as usually uttered by him, would not have meant dissent.

Here plainly "no" was not a proposition, but the tone it was uttered in was of propositional value—at least vocal pantomime. It matters not what trick or dodge (tone of voice, cardsharper's smile, &c.), be used to express assent or dissent, or to express any relation betwixt things; if so used, there is a proposition.

Some years ago I had under my care in the London Hospital a man whose sole utterance was "no," and something like "eh," which was "yes" to him. His wife told me he could make the children "behave when they were at the top yard" by shouting out "No." "no," "no," in an angry tone. These emotional utterances of his may seem to have some slight propositional flavour; he may have *used* "no" in an angry tone, not merely uttered it during vexation.[1] This, however, is doubtful. The patient could reply "no," but the slight degree of his power of expressing himself may be judged of by his way of getting his children to understand what he wanted. He would make one stand before him; she would guess one thing after another until, by quickness or by lucky accident, she guessed what he wanted, or until he knocked her down with his fist. I shall have to refer to this case several times, and shall therefore call the patient "Dow."

(*b*) In some cases of loss of speech there is a use of the word "yes" and "no," which is higher than a mere emotional service. The patient can reply with them. Here, then, is evidence that the so-called speechless man is not absolutely speechless; he propositionizes by "yes" and "no." Now we have come to a very important matter. In the case of "no," at least the use of that word does not in all patients reach the level of normal speech; or, speaking more correctly, the patient cannot utter that word in all the ways healthy people can. He may be, as

[1] If a speechless man retains the two words, it is reasonable to suppose that the emotions of fear and anger would, to speak figuratively, appropriate the negative one, and that emotions of joy and sympathy would appropriate the affirmative.

aforesaid, able to reply "no" to a question requiring dissent, when he cannot say the word when he is told and when he tries. This has been observed and commented on by Sir Thomas Watson, in the last edition of his "Practice of Physic." I found it out when giving a clinical demonstration of "Dow's" case. I told the students that he could utter the word "no"; but, to my chagrin, when I asked him to utter it, there was nothing but an articulatory effort. However, on asking him the preposterous question, "Are you ninety years old?" the word "No" came out at once. Again I asked him to say "no": his efforts were fruitless, but we readily got the word out of him again by asking him another question, which obviously required a reply of dissent. His difficulty was not from nervousness; his wife had found out, before I did, that he could not say "no" when he tried.[1]

I find that I have led Kussmaul to misunderstand me on this matter. This distinguished physician writes: "Jackson and Sir Thos. Watson have even found that aphasic persons, unable to reply 'no' to a question, have nevertheless been led to do so by suggestions designed to make them angry, e.g. 'were they a hundred years old, or a thousand?' or such like." The questions were not designed to make the patients angry, and did not make them angry. The patients I speak of could reply by "no," at any time. A very preposterous question was asked in order that there might be no possible doubt that a negative was required: and I submit that the rejoiner "no" to such a question by the patient "Dow" was a reply, that it was "no" as a proposition; that it was speech, although inferior speech (not incomplete speech); and that it was not "no" as a mere utterance, like an oath coming out in anger. This patient, as I have stated, did use the word emotionally when vexed; but not so in rejoinder to the preposterous questions I asked him.

(*c*) In many cases of loss of speech, the patient, besides having the

[1] The following is from the "Hospital Reports" of the *British Medical Journal*, December 2, 1871 [20], and refers to a case of loss of speech; ". . . She was told to say 'no,' and could not. Directly afterwards, Dr. Hughlings-Jackson, observing she had a book on her lap, asked if the patient could read. Hearing this, the patient herself looked up and said 'No, no, no.' She was again told to say 'no'; she could not. The nurse, having observed this peculiarity in another patient, said, 'Are you a hundred years old?' the response was 'No,' with a smile. Once more the patient was asked to say 'no,' but again she failed. . . ." It must be added that in her ordinary "conversation" she sometimes said "no," when she meant "yes." In some cases there is no difficulty in saying "no." Thus, there is in the London Hospital an old woman who can utter only the words "yes" and "no," and "titty," "titty," "titty"; and another old woman who has both these words and the utterance "I'm very well," or "Very well." Each of these patients can say "no," when asked. Hence it is admitted that some aphasics have the full use of these words.

emotional service and also the power of reply with the words, can say "yes" or "no" when told (he has the full use of these words). It may be said that this third degree of utterance of the word is not speech; that it is uttering the word as an articulatory gymnastic "for the sake of uttering it," not *using* it as a proposition. There are weighty reasons, however, for drawing attention to the three degrees of utterance of this word. The inability to say "no" when told, with ability to utter it in reply and also emotionally, is one of the most important facts in the matter of affections of speech. I shall speak on this matter after considering analogous peculiarities.

To resume. In some cases called *loss* of speech there is not absolute loss. The utterances (1), (2) and (3) are not exceptions; the utterances "yes" and "no" in reply, are exceptions, these words being *used* as propositions.

These exceptions are very significant. The man has lost all speech, except the two most general, most automatic, of all his propositions. They are indeed very significant exceptions to the empirical division into loss of intellectual and conservation of emotional language; for, even regarded superficially, they stand on the border ground. These words are used by healthy people, now one way, now the other; they are sometimes parts of emotional manifestations, and may then be combined with an ordinary interjection as in "oh! yes," or be duplicated as "no, no"; here the second "no" at any rate is interjectional. They are at other times used with full and definite propositional intent to signify "this is so," or "is not so." The word "yes" may be used at the same time, both for sympathy and agreement, it being occasionally hard to say whether the intellectual or the emotional side is more visible. Similarly some movements are at once pantomimic and gesticulatory.

We hear these words used almost purely emotionally, very often. A woman suffering from pleurisy and in great distress, replied "No" to a question, used the word propositionally, and then went on uttering the word as a vehicle of tone, "no, no, no," in just the same way as she had been uttering "oh!" before the question; that is, it served her emotionally. A healthy man told suddenly a piece of startling news, cries "No!" using "no" not actually to deny the truth of the statement; indeed he does not use it as a proposition; it is an ejaculation of surprise, equivalent to the exclamation "Nonsense!" or "You don't say so!" These so used are interjections, not speech, and take low rank in language, little above that of bodily starts, parts of common

emotional language. At the best they are propositions, entirely subordinated to the service of an emotion.

Then propositionally "yes" and "no" give assent or dissent to anything whatever; they are the blank forms of, or stand for, all negative and positive propositions—are, as it were, propositions almost reduced to positive and negative copulas. From their almost universal applicability they are very frequently used; they are the most general, most automatic, and most organized of all propositions. They are then exceptions proving the rule; the patient has lost all speech except these two propositions which are at the "bottom" of intellectual language and at the "top" of emotional language. In other words, the retention of these two words is not exceptional to the principle of dissolution. The reader may, however, urge that the other recurring utterances are exceptional. I hope to show, later on, that they are not. At present I only say that I believe them to represent what was, or to represent part of what was, the last proposition the patient uttered or was about to utter when taken ill.

(2) Occasional Utterances.

These utterances are rare, except that some patients swear very frequently. We shall make three degrees of these ejaculations:—

(1) Utterances which are not speech.

(2) Utterances which are inferior speech.

(3) Utterances which are real speech.

(1) Under excitement, the speechless man may utter "Oh!" or "Ah!" More than this, he may swear or utter certain nasty words used by vulgar people when excited. (We use the term "swearing" in the wide sense of what is popularly called bad language; of course religious commination is not considered.) The occasional utterance may be an innocent ejaculation, as "Oh dear!" or "Bless my life!" None of these utterances are speech; they have no intellectual meaning. Moreover, the patient cannot repeat them when he tries, he *utters* but does not *say*. This will remind the reader of what was said of some patients who can reply "no," but cannot say that word when they are told to try. The patient "Dow" uttered the word "damn" one night when vexed on his daughter coming in very late. Her mother told me of their surprise, and that her daughter said she would stay out late every night to get him to speak. But he could not repeat the expression. I never heard of any utterance in his case but of "damn" on that occasion, and his recurring "no" and "eh" (yes).

As said above, it is not a question of oaths only, but of ejaculations in general (interjections simple or compound).[1] They are all parts of emotional language; their utterance by healthy people is on the physical side, a process during which the equilibrium of a *greatly* disturbed nervous system is restored, as are also ordinary emotional manifestations. (All actions are in one sense results of restorations of nervous equilibrium by expenditure of energy.) In some people oaths and vulgar interjections have become very deeply automatic; some people swear largely along with their ordinary unexcited speech, perhaps to give emphasis to commonplaces. In these people the oaths are almost as automatic (their nervous arrangements being strongly organized) as smiles and frowns; they are, so to speak, "detonating commas." No wonder that they are occasional utterances when these patients are speechless. Few women swear, but their ejaculations of surprise or vexation (feminine oaths), as "Oh dear!" "Dear me!" "How very tiresome!" belong to the same category. The aphasic woman, whose recurring utterance was "Me, me," &c., once ejaculated, "God bless my life!"

(2) There are occasional utterances which are real speech, but inferior speech. This remark may be indefinite, but illustrations will show what is meant.

I saw, in consultation, a patient who had the recurring utterances "no" and "what." This patient was heard by his doctor to say "Wo, wo!" when standing by a horse. This patient once uttered "That's a lie," which is an expression often used by vulgar people as a verbal missile, that is emotionally rather than propositionally; it therefore comes under No. 1. The utterance "Wo, wo!" is the one I wish to draw attention to now. "Wo, wo!" is a proposition to those who use it, if not to animals; it means "stand still."

A woman who could only utter the phrase "Yes, but you know," once said "Take care!" when a child was in danger of falling. A patient of Trousseau's said "*Merci*" when a lady picked up his handkerchief. A patient of mine, would, besides swearing when vexed (No. 1), say "Good-bye," when a friend was leaving him.

[1] I take the following from an unsigned review in the *Journal of Mental Science* for April, 1878, p. 125: "The value of swearing as a safety valve to the feelings, and substitute for aggressive muscular action, in accordance with the well-known law of the transmutation of forces, is not sufficiently dwelt on. Thus the reflex effect of treading on a man's corn may either be an oath or a blow, seldom both together. The Scotch minister's man had mastered this bit of brain-physiology when he whispered to his master, who was in great distress at things going wrong, 'Wad na an aith relieve ye?' It has been said that he who was the first to abuse his fellow-man instead of knocking out his brains without a word, laid thereby the basis of civilization."

The man who said "Wo, wo!" could not repeat it; and the lady could not repeat "Take care!" The friends of Trousseau's patient thought he was beginning to speak; but he could not repeat the word. My patient could never say "Good-bye," except under the appropriate circumstances; his daughter had found this out herself.

The following is from a communication made to the *Lancet*, [*vide* p. 105] on this patient's case. Several different phenomena are mentioned. They are all of the same order, in so far that they show conservation of automatic with loss of voluntary action.

"I have seen a patient who usually sat up in his room, whose face looked intelligent, who was cheerful and merry, and who seemed to understand all that I said to him, but who could not put out his tongue when he tried. His daughter remarked that he could put the tongue out, as she expressed it, 'by accident,' and added, as an illustration of her meaning, that when anyone was leaving him he could say 'good-bye,' but that he could neither put out his tongue, nor say 'good-bye' when he tried. He could say 'yes,' and 'no' at any time; and, using the lady's expression, could say 'good-bye' 'well,' 'never,' *by accident*. She further remarked that the patient would sometimes swear. He uttered the short explosive word which is so much in favour with English swearers, but he could not, she said, repeat the word when he tried. She asked him to utter the explosive sound when I was there, saying it herself for him to imitate. He laughed and shook his head."

Admitting the utterances (No. 2) to be exceptions, we have to note that, as exceptions, they are significant. They are true speech, but they are inferior speech. Superiority in speech does not mean number of words, nor even solely precision of application, but precision of application to new relations of things, that is, in effect superior speech is accurate speech on complex[1] matters. We do not find that the loquacious person speaks precisely, except on the most familiar things; on novel things he fails greatly. The "faculty" of speech is not, as

[1] Although of necessity we take type cases, we not only consider what we call exceptions to the type, but in actual practice we consider individual peculiarities. What is well organized in one person is not so in another; when we say that the more automatic, more organized, &c., remains, we mean what is more organized in this or that patient. The qualifications to be understood in using such expressions as "*the* concept," "*the* English language," "*the* environment," need not be pointed out. In such expressions as "from *the* special to *the* general," "from *the* complex to *the* simple," the obvious qualifications must be kept vividly in mind. When we speak of complexity of any actions, we do not mean any sort of abstract complexity. A man in delirium goes through very complex manipulations of his trade, but they are not complex to him.

popularly supposed, highly developed in him. The utterances are well organized; they were prompted—to speak popularly, helped out—by their special circumstances. They are only in degree less significant than the occasional utterances (1), or than the recurring utterances (4). Besides this, the inability to repeat them is to be carefully borne in mind.

(3) I have records of still higher degrees of utterance by one speechless patient. A man, for several months under my care in the London Hospital, was absolutely speechless. He never *uttered*, much less spoke, anything but "pooh," "pooh," so far as I or the students or the nurses knew. But I was told by his friends of three utterances. Once, when he had had enough bread-and-butter, he said "No more." This, however, is only a degree of speech on a level with those in the just-given illustrations (2). But I was told that one day the patient said, with difficulty, "How is Alice (his daughter) getting on?" A third utterance was, I think, as high, if not still higher, in speech. His son wanted to know where his father's tools were. In reply to his son's questions, the patient said "Master's." Although here is but one word where in health there would have been a sentence, there is a proposition; it told his son where the tools were as fully as the most elaborately worded and grammatically complete sentence would have done. It was far higher than the most elaborate oaths and higher even than such utterances as "no more," "good-bye," "very well," &c. Once more I would urge that speciality in speech ("high speech") is not simply an affair of number of words, nor simply of complexity of their arrangement. We have to consider precise adaptation to special and new circumstances; "master's" did not come out upon a common and simple occasion like "good-bye," it was definitely uttered to signify a very special relation, moreover a new relation. Granting for the sake of argument—which, however, I do not know—that the man had in health replied scores of times to the same question by that word, or by a fuller proposition containing it, it was specially used for a new occasion under, that is, very new circumstances. The father had left his work, would never return to it, was away from home, his son was on a visit and the question was directly put to the patient. Anyone who saw the abject poverty in which the poor man's family lived would admit that these tools were of immense value to them. Hence we have to consider as regards this and the other occasional utterances the strength of the accompanying emotional state. We shall consider the influence of strong emotions which imply great nervous tension on the production of these utterances later on.

I used to receive reports of these utterances and sayings by speechless patients with great incredulity, and so I find others have done. One of my most intelligent pupils, to whom I was speaking of such utterances, told me that the wife of a speechless patient, with much indignation at his (the student's) incredulity, affirmed that her husband (otherwise speechless since his attack) uttered, before he died, "God bless you, my dear!" This utterance, if largely emotional, was a painfully appropriate one from a dying man to his wife. He may have uttered it interjectionally scores of times when well, and have *said* it when dying; really *meaning* that God should bless his wife. Under some circumstances truths that have died down into truisms become alive again.

The Communist orator who began his oration by "Thank God, I am an Atheist!" used "thank God!" as a mere expletive. Even when this phrase is uttered devoutly, it is often more emotional than propositional; but in some states of mind it doubtless is *said* with full propositional intent. Much poetry, in prose and verse, nowadays seems to be an attempt to show the truths of what have become uninfluential truisms.

These utterances naturally surprise the friends of speechless patients. A patient, fatally ill, unable to tell what she wanted (this patient had not entirely lost speech), surprised her sister by exclaiming, "Surely you must know what I mean!" after that she said nothing intelligible. A patient under my observation in the London Hospital could utter many words, but his oaths and other ejaculations were alone properly uttered; a patient in the next bed felt insulted on being asked to note what the patient uttered. Naturally he would feel that a man who, when asked to write, ejaculated, "What's all this bloody nonsense about?" could talk if he liked.[1]

Gairdner had an aphasic under his care in hospital, and wishing to learn something as to the patient's general condition, asked another man in the ward what *he* thought of him. "I think a guid whuppin, wad be

[1] Dow's wife told me that the neighbours were very unkind; they said it was all nonsense about his being unable to talk, for why did he not write? They could not be expected to know that if speech goes, writing goes—expression in writing is meant; Dow copied a good deal, and could sign his name without copy. Had they heard Dow utter "damn" because his daughter came in late, they could have felt the correctness of their opinion of his case to be demonstrated. In general the laity cannot be expected to know that swearing, &c., may persist when speech proper is impossible, and certainly not that a higher kind of utterance may persist when the patient is fatally ill. No doubt many apoplectic persons found in the streets are locked up for drunkenness because the policeman does not know that swearing is a very automatic process, which can persist under conditions produced by fatal brain lesions as well as by drink.

the cure of him." On Gairdner remarking that the patient could not speak, the man replied, "Na, but he swears whiles"; evidently believing that the poor fellow was shamming. The aphasic died, and cancer of the brain was found at the necropsy.

In some cases of speechlessness, an elaborate utterance comes out of which we cannot guess the meaning. The following case is an illustration of this, and also of other utterances. A patient under the care of Dr. Martin, in St. Bartholomew's Hospital, could only utter the word "yes." The Sister of the ward (a very intelligent lady) remarked that he uttered this word when he meant "no"; moreover, she said he often nodded when he meant "no." One of the nurses told her that the patient once, in words, asked for beer; but the Sister remarked, "I don't believe this, as I was constantly with him, and never heard him say anything." I think it very likely he did, under strong excitement (active desire), get out a proposition to that effect. It may be said that there could be no excitement about so small a matter. But it is no small matter to many hospital patients. Some will leave the hospital if they do not get beer. But the utterance I wish to draw attention to is the following. His wife said that all she ever heard him utter beyond "yes," was "Five nights, six nights, seven nights, and then five nights out of seven." What this meant she could not guess.

To resume once more. There are three exceptions to the statement that our "speechless" man is absolutely speechless. He may have permanently the utterance of the words "yes" and "no," and the full use of them: their use as speech. On the other hand, we have noted that a patient may have only the emotional or interjectional use of them, and that when he has, more than this, the ability to reply with them, he may be unable to say them when told. And where there is the full use of them, we have to bear in mind that they are the most general of all propositions. Then he has *occasionally* some inferior speech, and as I believe this to be effected by the right half of his brain, I admit that these occasional utterances show, as do "yes" and "no," some power of speech during activity of that side. Anyhow, they show that the patient retains organizations for some words somewhere in his nervous system.

There is no demonstration by these cases that the patient retains organizations for any other words than those he actually utters. But is it a likely thing that Trousseau's patient, who said "merci," when a lady picked up his handkerchief, had just that word or a few such words left? A fire occurred in the street opposite one of my wards in the

London Hospital: a speechless patient of mine cried out "Fire!" Is it not a grotesque supposition that this woman retained only the word "fire"? Moreover, those who say a patient tried to repeat any of his occasional utterances are tacitly admitting that the words of those utterances are revived in him; otherwise the word tried has no meaning. There is demonstration by other means that the speechless patient retains a full service of words; he understands what we say to him. At any rate, the utterances spoken about show that there is retention of some words, if only a fragment or so in each case. Some of them also show that there is not only retention of some words, but of some speech, by the right side of the brain. The division we made was not that the left half of the brain serves in speech, and the right in receiving speech and in other ways, but that "nervous arrangements for words used in speech *lie chiefly* in the left half of the brain," and "that the nervous arrangements for words used in understanding speech (and in other ways) lie in the right also. It is believed that the process of verbalizing and every other process is dual, but that the more automatic a process is, or becomes by repetition, the more equally and fully is it represented double in each half of the brain. But the utterances show too, for the most part, that the speech possible by the right side of the brain is inferior speech. In nearly all cases it was well organized, automatic or "old," and nearly every utterance required a special occasion: was, to speak popularly, surprised out of the patient by a sudden accustomed stimulus. And it is to be borne in mind that the patient cannot repeat, say voluntarily, what he thus utters. So far these exceptions are exceptions proving the rule.

It has been admitted, however, that occasionally there is an utterance of high speech value. This exception will be considered after a while.

ON AFFECTIONS OF SPEECH FROM DISEASE OF THE BRAIN.

[BRAIN, 1880, vol. ii. p. 323.]

IT will doubtless have struck all physicians as strange that speechless patients should have such recurring utterances as jargon No. 1 (p. 132), or single words, No. 2 (p. 132), or, what is most striking, such as "I'm very well," "Come on to me," No. 3 (p. 134).

It may perhaps be well to give some examples of these several kinds of recurring utterances from Trousseau's admirable lecture on aphasia. (I take them from Bazire's translation for the New Sydenham Society, adopting his rendering into English of the utterances of real words from the French; some of the utterances were jargon.) One patient could utter nothing whatever else than "Oh! how annoying!" Trousseau says of this patient: "Although she looked intelligent and behaved like a sensible person, I could never obtain another word from her." Another patient uttered, "Vousi, vousi." Another at first could only utter "Monomentif"; later on a few monosyllables ended by "tif," or the first syllable of a word and "tif" instead of the second, as "montif" for monsieur. Another uttered "Pig, animal, stupid fool," and that alone. Another "Nasi bousi, nasi bousi." Another, "My faith!" Another patient, "Cousisi, cousisi." (This patient, by the way, had the occasional utterance when very excited, "Sacon, sacon," which Trousseau supposed to be abbreviation of "Sacré nom de Dieu.") Another, only "Oh! mad." Another, "Sacré nom de Dieu."

It will have occurred to the reader that these utterances are not in the same category as "yes" and "no" in regard to the hypothesis stated (p. 140). We cannot say that the cases in which they remain show a reduction to the most general of all propositions. Some of the utterances of Group No. 3 are propositional in form, but yet not of use as propositions to the speechless man; they are to him not propositions at all, figuratively speaking, they are propositions intellectually dead; they serve only emotionally, and in that way subsidiarily as a sort of

articulatory material on which the voice may vary. "Yes" and "no," Group No. 4 (p. 135), also are occasionally from the mouth of the speechless man, intellectually dead (see No. 4 (*a*), p. 135), and serve only emotionally; nevertheless these utterances so serving are in a different category from those of Group 3. We have even on this basis to ask, "How is it that some speechless patients retain an utterance of no propositional value to them, but one which to healthy people is a proposition of a *special* character, applying to a particular combination of circumstances, whilst other aphasics retain an utterance of no propositional value to them, but one which to healthy people is of propositional value of the most *general* character, applying to any combination of circumstances?" Of course, the utterance may be an elaborate (compound) interjection, as "Oh, my God!" but we prefer considering those utterances which in health are propositional.

The problem may be presented in one case. A patient has "yes" and "no," and has also some elaborate recurring utterance in propositional form. Supposing his "yes" and "no" to be utterable only emotionally, we may say that he has two intellectually dead propositions one of a highly special kind, another of a very general kind.

We wish in this instalment to show that the retention of recurring utterances other than "yes" and "no," although apparently, is not really exceptional to the principle of dissolution. In all cases of dissolution there is supposed to be a reduction to the more automatic, more organized, to the earlier acquired of the processes represented in the centres affected. It is, I think, plain that this course is in some cases apparently irregular. There are conditions interfering with what we may designate the simple course of dissolution.[1] Let me illustrate this by a case from another class of nervous affections. Just after a slight epileptic seizure there is dissolution, which in this case is

[1] The reader is asked again to observe that the term "dissolution" is used, as it is by Herbert Spencer, for a process which is the reverse of evolution. I am sometimes told that it is not a fit term to apply to the results of disease on the nervous system, granting that those results are the opposite of evolution of the nervous system. I do not believe they can be shown to be the exact corresponding opposite. Even supposing that the term does not properly apply, I submit that it is inexpedient to coin another word for a process the reverse of nervous evolution, when dissolution is already in use for the reverse of evolution in general. Affections of speech are examples of dissolution occurring in a subordinate cerebral centre. Insanity, as for example the case of post-epileptic insanity mentioned in the text, is dissolution, beginning in the highest cerebral centres, in those centres which are supposed to represent all that the subordinate centres have already represented, and thus, indirectly, to represent the whole organism. The highest centres are the substrata of our highest, latest, ever-changing mental states, the abstract name for which is consciousness, there being really a series of consciousness.

temporary loss of function of more or fewer of the highest of all nervous arrangements; the patient acts grotesquely; but his actions (occurring during energizing of nervous arrangements next lower than those which have undergone dissolution) are not always rangeable as being more organized, &c., than his usual doings, sometimes they are plainly largely determined by particular events happening just before the seizure—that is to say, there are conditions interfering.

The matter to be discussed is not of scientific importance as bearing on the principle of dissolution. The discussion will help us, I think, to clearer notions on the nature of defects of speech. Were recurring utterances alone in question it would not be worth a physician's while to consider them at much length. We shall in the next instalment consider other kinds of nervous disease in which we find phenomena analogous to the recurring utterances of speechless patients.

The following hypothesis is advanced, and for the present is applied to but one set of recurring utterances, the group No. 3 (p. 134), and only to those of them which have in healthy people propositional value. *Such recurring utterances as "Come on to me" were being said or rather were about to be said when the patient was taken ill.* Here we have, it is suggested, a condition interfering with the simple course of dissolution.

In order that we may show this hypothesis to be reasonable, the reader must bear vividly in mind that "taken ill" means here the occurrence of damage in a region of but one half of the brain, the left usually, sufficiently extensive to cause loss of speech. He must keep in mind that the nervous arrangements in this cerebral region are *destroyed;* it will not do to think of the disease vaguely as something "disordering certain functions of the brain." And on the psychical side he must look on the condition as one of *loss of the words* used in speech. The expression, 'loss of memory for words,' is too indefinite, or is only verbally definite. It is equally important for him to bear vividly in mind that the other half of the brain, the right usually, is not at all injured. He is asked never to lose sight of the fact that, although the patient is rendered speechless by the disease, he is not thereby rendered wordless. We must, indeed, bear most vividly in mind that *the patient has words remaining;* it will not do to think of this positive condition under the vague expression that "he retains a memory of words." If we do use such redundant expressions, we must be thorough in our application of them and say two things: (1) that the speechless patient *has lost the memory of the words serving in speech,* and (2) that *he has*

not lost the memory of words serving in other ways. In healthy people every word is in duplicate. The "experiment" which disease brutally makes on man seems to me to demonstrate this; it takes one set of words away and leaves the other set. The speechless patient has *lost* that set of words which serves in speech; he *retains* another set of words serving in other ways;[1] he *retains* all the words of the (his) English language in so far as "receiving speech" of others goes; and for other purposes he has *lost* their duplicates by which he should speak. It is suggested that whilst the speechlessness answers to the damage in one half of the brain, the retention of other kinds of service of words answers to the fact that the other half is not damaged. Attention is also asked to the hypothesis already stated, and hereafter to be expounded at length, that every proposition in health occurring during activity of the left side of the brain is preceded by a revival of the words of it during activity of the right half.[2] This is stating the hypothesis roughly and inadequately; all that need be insisted on is that the unit of action of the nervous system is double the unit of its composition, and that, correspondingly, all mental action is dual; subjective followed by objective. But, as roughly put, the hypothesis will serve our present purpose, since the speechless patient has no left half of his brain so far as its use in words goes.

Here brief remarks may be made on dual action in other mental processes in order to make clear what is the nature of the dual service of words. If I do not succeed in showing that there is a duality of mental operations and what is the nature of that duality, I shall fail to make clear my meaning as to the nature of recurring utterances

[1] The use of such highly technical expressions as "memory," in "explanation" of complex symptomatic conditions, seemingly definite and authoritative, is largely to blame for our remaining with our ideas on nervous diseases out of focus. It is not always vividly realized that retention of memory of words can mean anything more than a retention of words, the word "memory" in that context being really surplusage. There is almost the idea that the speaker *gives* words to the persons spoken to; all the speaker does is to rouse words already organized in the person spoken to. Anyone will readily admit that the pain of a pin-prick is in himself, not in the pin; and every educated man admits that redness is in himself when he uses the ordinary language, "this brick is red." Why, then, should we speak of "retention of memory of words" by the aphasic when he understands what we say to him without, at any rate, using that expression as simply convertible with the expression that he retains words (physically organized nervous arrangements for words)? Whose words are those which occur in the so-called hearing "voices" of the insane?

[2] There are, then, it is supposed, two services of words by the right half of the brain: the "reception" of words of others, and the reproduction of words which precede our own speech. These are the two ways other than speech in which words are supposed to serve. Doubtless at bottom these two are alike.

and to interpret many other difficult parts of our subject. We take for illustrations ideation and perception; that is to say, "propositions of images," which are symbolized by propositions strictly so-called. This is truly a part of our subject. It is, indeed, an entirely arbitrary proceeding to separate the images symbolized from the symbols of images; in what we shall call the "conflict" both are concerned. Nevertheless the artificial separation of them is convenient in brief exposition. It will suffice for illustration to take count of but one image, although two images must be concerned in every ideational or perceptive process and also in the stage preceding ideation or perception (ideation may not be followed by perception, but ideation must always precede perception).

It seems clear enough that the process which ends in ideation or perception is dual. *Before* we can see or think of a brick, before either ideation or perception can occur, that brick, by actual presentation or by indirect presentation through association, must have roused an image in us. When we say we see a brick, all we mean is that we project into the environment, ideal or actual, the image which that brick has roused in us. This image arisen in us is the survival of the fittest image at the termination of a struggle which the presented brick has roused in us, is the end of the subjective stage; the further stage, or the second stage, is objective—it is referring the image already roused in us to the environment, actual or ideal. The brick is for us nothing more than what it has itself roused in us, so that, instead of using such figures as that "the mind impresses its own laws on sensations we experience during contact with external objects," or "that the mind originates something additional to them," or "works them up into different shapes," or that it "impresses its own form on them," we should, I think, use the opposite figure that an external object acts on us and develops in us such as we are, *what it can*, we being at first passive and it active. I think it is plainly so in dreams excited by peripheral local excitations. And in reverie, cracks and marks in the burning coals make us see faces in the fire, rouse faces in us.

Returning to the dual service of words. If we coin the term "*verbalizing*" to include the whole process of which speech is only the end or second half, we may say that there are in it two propositions: the subject-proposition followed by the object-proposition, the latter being called speech. Spencer writes ("Psychology," vol. i, p. 162): "A psychological proposition is necessarily compounded of two propositions, of which one concerns the subject and the other concerns the object,

and cannot be expressed without the four terms which these two propositions imply." It is supposed that the subject-proposition is the "survival of the fittest" words in fittest relation during activity beginning in the right half of the brain, and that this survival is at once the end of the subjective and the beginning of the objective stage of verbalizing. The subject-proposition symbolizes an internal relation of two images, internal in the sense that each of them is related to all other images already organized in us, and thus it symbolizes states of *us*. The object-proposition symbolizes relation of these two images as for things in the environment, each of which images is related to all other images then organizing from the environment; thus it stands for states of the environment; the two propositions together symbolize an internal relation of images in relation to an external relation of images. Thus the separation we have made into speech use of words and not speech use of words may appear arbitrary; it is, however, convenient.

In one of the cases to be presently mentioned in the text—the patient who said "Come on to me"—there was *left* hemiplegia, and thus the inference is irresistible that his speechlessness was caused by damage in the right half of his brain. But as he was a left-handed man, his case is an exception proving the rule. It is admitted that there are cases of left hemiplegia with aphasia in persons who are not left-handed. Besides granting fully the significance of the fact that in the vastly greater number of cases loss of speech is caused by disease in the left half of the brain, the thing of infinitely greater significance is that damage in but *one* half can produce speechlessness. It is equally significant that damage in neither half produces wordlessness.

In a few cases I can state the circumstances of the onset of the illness, which seem to me to countenance the hypothesis stated. The man whose recurring utterance was "Come on to me," and sometimes only "Come on," was a railway signalman, and was taken ill on the rails in front of his box. A woman in Guy's Hospital could only utter "Gee gee"; she was taken ill whilst riding on a donkey. Dr. Russell, of Birmingham, has published the case of a clerk, who lost speech and became paralysed on one side, after hard work in *making a catalogue*; this poor fellow could only say "List complete." Sir James Paget a few years ago had under his care in St. Bartholomew's Hospital a man whose left cerebral hemisphere was injured in a brawl. This man could only say, "I want protection."

The hypothesis further unfolded, but applied only to the above-mentioned cases for the present, is that the words of the recurring

utterance had been revived during activity of the right half of the brain, when the destruction of that part of the left half occurred which caused loss of speech; that they constituted the last proposition, or rather that stage of verbal revival (what we have called the subject-proposition), prior to the last proposition (the object-proposition). Even after they were meaningless or, figuratively speaking, dead propositions, remaining utterances of which we can only say they were on one occasion speech; on that occasion fitted to indicate then occurring relations of things. On the rails, or certainly at some juncture, "Come on to me" *meant* "Come on to me," ever after the illness it meant nothing.

The expression "on one occasion" is not to be taken literally as meaning that; for example, the man who uttered "Come on to me" never said that before he was taken ill on the rails. The presumption is that he had said it on many occasions, when trains were approaching his post. What I mean rather is, speaking now of the healthy, that there is no such proposition in a man's mind, excepting when he is saying it. On the physical side we would suggest that the nervous arrangements concerned during the utterance of any such proposition are not excited, nor ready to be excited, in the particular order answering to such proposition except at the time of uttering it. Such propositions are new speech. The "same" proposition is new or "latest" speech each time it is uttered, if the words or syllables of it are not, so to speak, "kept ready made up" in that particular combination; at any rate it is "latest speech" when specially applied at a particular time to indicate then occurring relations of things which *are not fully organized*, it is then, otherwise stated, a voluntary use of words.[1]

From the most automatic or "oldest" or "earliest" speech, applying to well-organized external relations of things up to newest speech, applying to now organizing external relations, or otherwise put propositions

[1] The very same "utterance" which has *become* automatic by being often used for symbolizing frequently presented, and therefore well-organized, external relations of things would be once more a voluntary utterance, if it were used on a new occasion, that is for symbolizing a relation of things not already organized, but only now organizing. The "highest," "latest," or "newest" speech (the now organizing or voluntary use of words), implies clear preconception; clear preconception is a necessary element for voluntary, as distinguished from automatic, operations; in voluntary speech the prior reproduction of words constitutes the preconception. If a man utters, as applying to a new set of circumstances, the most automatic utterance he has, or if he utters anything "for the sake of uttering it," as when asked to do so, there is then a voluntary utterance, for then the operation occurs after clear preconception. Disease shows this not to be a fanciful dictum. As we have seen, and we shall later on give further examples, a speechless patient may be unable to *say* (to repeat) what he has just uttered. We do not affirm that the word "say" in this context means a language process.

now in the making, there are, it is supposed, on the physical side, only degrees of independency of organization in the sense that the nervous centres concerned have lines of different degrees of resistance to currents of different force, entering the centres at different points. Other things equal, the more automatically serving (the more organized) nervous arrangements are lines of least resistance. There is, however, in the case of very frequently used and very automatic utterances, such as "Very well," "I don't know," a near approach to independent organization, and in the case of the most common interjections a very near approach to it. Such utterances constitute what I call old speech, or, in the case of interjections, they are verbal processes lower and earlier than true speech—utterances not "now making," but nearly, if indeed not quite, "ready made up." And at the other extreme, in the highest, newest, or latest speech, there remains for a short time after the utterance a slight degree of independent organization of the nervous arrangements concerned; did there not, we should not know what we had just said, and could not go on talking consecutively on any subject. If this reasoning be correct, such a recurring utterance as "Come on to me" represents not only the last proposition *en permanence*, but it is to be looked on as on the physical side, a keeping up of activity (of a greater readiness to discharge), of certain nervous arrangements, which normally exist only temporarily and only on special occasions, in particular combination, and which in health go quickly into subordinate function, and soon out of function.[1]

Such a recurring utterance as "Come on to me" was about to be new speech; the words remained *en permanence* as a dead proposition; a proposition stillborn. We can now describe the case of a man who has two sets of recurring utterance as that of a patient retaining a new combination of words, and also an old combination, or rather in the latter two monosyllables, each of which is equivalent to a combination of words.

The reason for thinking that the recurring utterances under remark were and continued to be utterances occurring during activity of the *right* half of the brain, is that the left half of the brain is so extensively damaged that the patient cannot speak; he has no left half for their utterance. To say that the disease "caused" these utterances—a positive condition—is absurd, for the disease is destruc-

[1] Practically out of function, so far as our present subject is concerned, although, obviously, there would be no new acquirements possible, and no memory, if some nervous arrangements after their use did not remain lines of less resistance than before.

tion of nervous arrangements, and that could not cause a man to do something; it has enough to answer for in leaving him unable to speak. The utterances are effected during activity of nervous arrangements which have escaped injury. This remark may seem a truism here, but in more complicated cases it is very common to hear of positive symptoms being ascribed to negative lesions—to loss of function of nervous elements. It is common at any rate for disease to be thought of vaguely as something "*disordering* the functions of the brain." In the cases we are now dealing with, and in cases of defect of speech, and also in cases of insanity, the function of some nervous arrangements *is lost or is defective*. But it is an error to ascribe such positive symptoms as the recurring utterances in speechless men, the erroneous words uttered by those who have defect of speech, and the hallucinations, &c., of insane persons, to negative lesions, to loss or to defect of function. These positive mental symptoms arise during activity of lower centres or lower nervous arrangements which have escaped injury, and are only to be thought of as symptoms in the sense of being the fittest psychical states arising during slightly hypernormal discharges of lower or more organized nervous arrangements which are *then* highest, the normally highest having lost functions.

It might be suggested that not all, but only nearly all, the substrata of speech were destroyed, and that enough nervous arrangements remained in the left half for just one utterance. Since, as implied in a foregoing statement, I do not believe that words or syllables have nervous arrangements in the sense that there is one little nervous centre for each syllable, or rather single articulation,[1] and for no other, and since, too, I believe that each unit of every nervous centre is the whole of that nervous centre in (different) miniature, I should be as ready as most people to accept this explanation. But a certain quantity of nervous arrangements, implying a certain quantity of energy, is required for every operation. As the recurring utterance is, as a series of articulations, very elaborate, and as the syllables are clearly enunciated at any time, it is not credible that slight remains of nervous arrangements can be concerned during the utterance of them, especially when looking at the matter on another

[1] The reader will observe that nothing is said in the text which implies that a word *is* a nervous arrangement representing an articulatory movement. All that is suggested (see p. 108) is that the *anatomical substratum* of a word is a nervous arrangement representing one or more particular articulatory movements. The reader will observe, too, that we sometimes speak of words, and at other times of their physical bases, but we do not, it is hoped, confuse the two different things.

side we see that these remains do not serve the patient to utter any other words whatever, except perhaps "yes" and "no," which I, however, believe to occur also during activity of the right half of the brain. The man who uttered "Come on to me" uttered it at any time, with no effort, rapidly and in fact just as well as a healthy person could utter it; yet except for this and "yes" and "no," he could utter nothing else. It is submitted that it is not possible that such an utterance was effected during discharges of remains of a nervous centre so extensively diseased, that is to say, not during discharges of any part of a half of the brain which was damaged so much as to cause speechlessness. It is more likely to be uttered during activity of the undamaged half.

We repeat, the patient may have not only such a recurring utterance as "Come on to me," but he may have also the utterance "yes" or "no," or he may have both these words. We have endeavoured to explain the retention of "yes" and "no," by saying that the patient is reduced to the two most automatic, the two most organized, of all propositions. We have tried to show that in a sense the principle of dissolution is not contradicted by the retention of the elaborate recurring utterances under remark. There are, we have suggested, conditions interfering with what we may call the simple course of dissolution. The patient retains not only his most automatic propositions, but his last proposition, the then most voluntary proposition; the former sometimes, the latter always, ceasing to be propositions.

Let us now look more particularly at the anatomico-physiological side: that is, examine the utterance from the side of degree of organization of nervous arrangements. We must bear in mind that, to speak metaphorically, all disease cares about is degree of organization; it respects processes the more they are organized, caring nothing about important or unimportant. At present we can only speak in outline.

In estimating organization in its bearing on affections of speech, or on any other sort of defects from nervous lesions, we have to consider recency of organization, as well as degree of organization. It is well known that in failing memory recent events are soon forgotten, whilst old events are remembered; but this is not without qualification; the *most* recent events are remembered as well as the old; on the physical side, nervous arrangements just discharged remain for a short time in a state of slight independent organization, rivalling that of nervous arrangements discharged when the person was young and vigorous, or that of nervous arrangements often discharged.

That the nervous arrangements for the words of the recurring utterance (No. 3) are parts of the patient is a truism; that the words must at one time have been revived in propositional form, that certain nervous arrangements must at one time have been discharged in a particular order, is another. The hypothesis that the words were being revived at the time when the patient was taken ill seems to me warrantable. As they remain always easily utterable, and they alone utterable, since the illness, it is plain that certain nervous arrangements which were being discharged when the patient was taken ill, or at any rate which were on some occasion being discharged in a particular definite order, remain permanently in a state of dischargeability far above normal. For the patient not only does not speak since his illness, but whenever since his illness he tries to speak, the recurring utterance comes out or nothing comes out. Note three equally important things: (1) He has it; (2) he has no other utterance (except perhaps "yes" and "no"); (3) he cannot get rid of it. It is certain that the nervous arrangements for the recurring utterance have somehow arrived at what is in effect a high degree of independence of organization. We can say, if the hypothesis put forward be true, that the nervous arrangements for the proposition *just organizing* at the time of the illness, those for the words last spoken or about to be spoken, remain as well *as the most and always organized* nervous arrangements for the most automatic propositions, and have somehow achieved a degree of independent organization greater than that of any other word-processes except "yes" and "no"; probably by repeated utterance after their first utterance. On this matter we shall speak later, when considering the phenomenon called by Gairdner "barrel-organism." At present the explanation given may seem to be merely a verbal one. We may consider part of the question at once. Repeating that the patient has the utterance, and that he cannot get rid of it, we restate the question thus: How is it (1) that destruction of one centre (certain part of the left half of the brain) leaves in state of hypernormal dischargeability particular nervous arrangements discharging in another centre at the outset of the illness, right half of the brain, a lower centre? And (2) How is it that they do not go out of function, as they certainly would have done had not that destruction occurred? We say again that the destruction in the left half is not the cause of the recurring utterance; a negative state of nervous elements cannot possibly be the cause of positive nervous symptoms. Nor is destruction of some nervous arrangements the cause, or at any rate not the direct cause, of certain other nervous arrangements discharging and

remaining in a state of hypernormal dischargeability. But plainly, if the man had not been "taken ill" he would not have had such a recurring utterance; he would have been able *not to utter it*, the nervous arrangements concerned would have gone out of function; but since his illness, he must utter it when he tries to speak, if he utters anything. I believe the solution of the seeming paradox to lie in this, that destruction of function of a higher centre is a removal of inhibition over a lower centre the lower centre[1] becomes more easily dischargeable, or popularly speaking, "more excitable," and especially those parts of that centre which are in activity when control is removed. So to speak, these parts become autonomous, acting for themselves, just as parts of the spinal cord below a diseased point become autonomous in some cases of paraplegia. Thus the disease *causes* loss of speech; it *permits* the increased dischargeability of the right half. It is just as cutting the pneumogastric does not cause, but permits, increased frequency of cardiac beats. But, the simple course of dissolution being interfered with in the cases of speechlessness we are writing about, the activity of the centre manifests itself in the way it was temporarily in when control was removed. The greater excitability of a centre uncontrolled by removal of its higher centre is supposed to be temporary, but the particular activity may be kept up by repeated use; the speechless man's recurring utterance is being uttered very often: it keeps up what was doubtless at first a temporary organization.

We must be very careful how we use the word "cause" with regard to disease and symptoms. We must never speak of destructive lesions causing positive symptoms. It is erroneous, I submit, to say that any sort of disease causes elaborate positive mental symptoms—illusions, hallucinations, &c.—it causes a negative mental condition, the elaborate positive mental symptoms are *permitted*. Here again we see the crudity of the expression, "disease disorders the function of the brain"; destructive lesions cause loss of function of some nervous arrangements, and thereby over-function of others is permitted. Another way of putting this is to say that the effects of dissolution are not always, never I suppose, simply those of removal of the more special, voluntary, and least and latest organized, but are very often also a permitted increased activity of the next most special, voluntary, and next least organized. Thus in every case of insanity there *are* two diametrically opposite symptomatic mental states together, and there must be correspondingly the opposite physical conditions together.

[1] Of course, we do not mean geographically, but physiologically lower, more organic, &c., and, in some instances, the centre which acts before the one called higher.

In some cases there is the utterance of "yes" or "no," or of both, without any other recurring phrase. This would be explained on the supposition that the patient was not saying, nor about to say, anything when taken ill, and thus that there were no words being revived, no proposition organizing, during activity of the right side of the brain. Thus there was, so to speak, nothing to interfere with the simple course of dissolution, reduction to the most automatic of all propositions.

It is to be clearly understood that in not one of the cases do I know what the patients are saying, or about to say, at the time of their attack. I must also mention that there are observations on record which perhaps run counter to the hypothesis. Thus a man, aged 21, suddenly called out to his mother, "Oh! I feel something extraordinary inside me." These were the last words he spoke, but his recurring utterances were "no" and "Mamma." Very likely, however, calling out to his mother, he would also have cried "Mamma."[1]

I must also declare that of other cases than those expressly mentioned, I know nothing at all of particular circumstances during the onset of the ailment, which could be supposed to have given rise to speech like the recurring utterances the patients had. I have no facts to bring forward to show what were the particular circumstances during the onset of the illness of the patients whose recurring utterances were severally "man," "one," "awful." "Yes, but you know," "I'm very well," &c. At first glance it seems unlikely that a patient should say, "I'm very well," at the time she was taken ill; but as a matter of fact, people becoming ill do make such remarks. Who has not heard a person say, when a little ill, or when a severe illness was beginning, "I'm all right, let me alone," perhaps adding the contradictory statement, "I shall be better directly"?

We must bear in mind that when people are not talking they may be speaking, for there is not only external, there is also internal, speech.[2]

[1] I take this case from a lecture by Trousseau; the utterances were in French, but I give them as translated by Bazire.

[2] The reader will remember that the distinction into internal and external speech (only a difference of *degree*) is not that made into the two *kinds* of service of words, the subjective and objective. There are degrees of each kind. The subjective, at any rate in that part of it which is "receiving speech" of others, is plainly in degrees; we hear and "receive" what people are actually saying, we also remember what they have said, which is having again, faintly, the words in ourselves which their speech had revived strongly. It must never be forgotten that when we hear and understand what anyone says to us, we can only do so because our own words are revived in us; if I have not the words "gold," "is," "yellow," organized in myself, it is of no use any one saying "gold is yellow" to me.

Whilst thinking on anything, at least beyond the simplest, we are using words, and when thinking on anything complex, are speaking internally. But I do not see how we are to verify the hypothesis that a patient's recurring utterance was a survival *en permanence* of the words he was internally using, unless perhaps the circumstances and the conditions of the patient are known very exactly.

We have to consider how the hypothesis applies to the recurring utterances, No. 1 and No. 2. How is it that there is (except perhaps "yes" and "no") jargon only, or but one word only? The difficulty is greatest with regard to the jargon (No. 1), and this I shall chiefly consider. I believe the jargon to be made up of fragments of the words or phrases the patient was about to utter when taken ill.

It is, I grant, a mere guess that a speechless woman, whose recurring utterance (I spell it from the sound) was "me" "me," "pittymy," "committymy," "lor," "deah," was saying, when she was taken ill, "Pity me," "Come, pity me," "lord," "dear"—that her recurring jargon-utterance represented what was part of the verbal revival prior to her last propositional or interjectional utterance, that it was a corruption of syllables of some of the words which were being revived during activity in the right half of her brain, when destruction in the left half produced loss of her speech. There is a greater difficulty in supposing that such a jargon-utterance as "yabby," resembling no English word, was made up of fragments of words which were being revived during activity of the right half of the brain, when the patient was taken ill. To say that "yabby" was a jumble of syllables of some words about to be uttered will appear to be carrying the hypothesis to its logical conclusion with more determination than caution.

Let us pause to remark on occasional temporary jargon, and on something approaching to it, in other aphasic cases. Some patients, who have only defect of speech, and whose erroneous utterances are nearly always real words, may occasionally utter "jargon," as "totano." I confess that I am unable to trace the steps of the formation of such jargon. Occasionally there is a very near approach to a transposition of syllables of a word. One of my patients said "gippin" for "pigeon."

Similarly the objective is in two degrees; there is both internal and external speech, corresponding to ideation and perception. Speech in *either* of these degrees is supposed to be preceded by an automatic and subconscious reproduction of words (by a subjective proposition), just as either "internal" perception (ideation) or "external" ideation (perception) is preceded by a subconscious and automatic reproduction of images. It is not meant that, either betwixt ideation and perception, or betwixt internal and external speech there are differences only in simple degree; the degrees are, I think, triply compound.

There is another kind of change: one of my patients said "lamb and crobster" for "crab and lobster." There is here a fusion of the first syllable of the second word with part of that of the first, or rather, perhaps, speaking of the physical side, a result of attempts at two articulations. Such blunders occur, I think, in persons whose speech is only very slightly defective: I mean in those who, for the most part, speak well. The following occurred in healthy people: "mukes from Boodie's," for "books from Mudie's"; "get a cash chequed," for "get a cheque cashed." A similar thing occurs in writing, as "Mear Dadam," for "Dear Madam"; "pred budding," for "bread pudding." (This is interesting, as showing that expression by writing is really speech.) I believe that these troubles of speech are owing to hurry on the right half of the brain, to hurried reproduction of the words of the subject-proposition. Believing that images and words are subjectively revived in an order the reverse of that in which images and words are finally arranged, I suppose, speaking roughly, that the words of the subject-proposition "come over" to the left side prematurely. These utterances are jargon, the sources of which we can trace, in so far, I mean, as fusion of an initial syllable of a second word with that of a first word goes. And I believe this to result from hurried action in patients who have defect of speech, partly for the reason that such and similar mistakes occur when a patient replies at once to questions abruptly put to him, and because when not hurried, when not "taken suddenly," he may speak for the most part well.

We can now return to consider more easily the permanent recurring jargon of patients who are speechless. We speak of what is supposed to have occurred in the right half of the brain, when the speechless patient was uttering, or about to utter, his last proposition. If the reader does not go with me in supposing that the right half of the brain is concerned, he must, at any rate, believe it is some part other than that on the left which the disease destroyed. It is suggested that when the recurring utterance is in clear propositional form, such as "Come on to me," the right half of the brain was acting normally or usually; that when it is a single word or jargon, it was acting abnormally, being "hurried." What is the cause of this hurry? I believe it to be strong emotion. At the time of the onset of the illness, we may suppose strong emotion would be induced by the external circumstances, or much more probably by the setting in of the illness, the patient being afraid of worse to come. Here, of course, a knowledge of the patient's temperament is very important. The patient who uttered "me," "me,"

"pittymy," "committymy," "lor," "deah," was, to my own observation, a most excitable woman. Her husband used to remark on this. He said she was fond of sensational tales; she would any time go out in the night to a fire. Strong, especially suddenly induced, emotion implies, on the physical side, great nervous excitation, that is to say, strong, wide, and sudden discharges; there will, under strong emotion, be more rapid and more numerous and therefore conflicting, discharges of nervous centres. In the cases under remark we consider the result of discharges on centres for words.

The result of numerous sudden, strong, and therefore conflicting discharges, would of course be the survival of the fittest, but the survival amidst too numerous and too strong discharges would not be an elaborate and perfect proposition. We suggest that it would be but one word or a jumble of syllables of some words. Of course "fittest" here does not mean "the best," nor the fittest *for* the *external* circumstances of the time; it is the survival of the fittest under the *internal* circumstances.[1] The fittest words of syllables are the victorious words or syllables, which have survived during a conflict of very strong and sudden discharges, beginning deeply in the nervous system, and ending, so far as we are now concerned, in that of many nervous arrangements for many words. Such survivals may be little fit or not fit at all to the then external circumstances, they express the emotions and ideas induced well or badly, as well as it can be done under the circumstances.

It is supposed that jargon is a survival of some of the syllables or articulations, more or less fused during the sudden termination or

[1] The words and images which survive during healthy discharges are survivals of the fittest. So it is in disease. The images that survive in delirium are the then fittest, considering that some of the highest nervous arrangements are *hors de combat*. The delirious patient is not the same person as that patient before his delirium set in; the delirious patient is the same man *minus* more or fewer of his highest nervous arrangements; his delirium is the fittest mentation then possible. In all cases it is supposed that what becomes conscious is what survives at the end of a conflict; the conflict is almost at zero in highly organized processes, such as those for recognizing very simple and very often seen things; in these cases consciousness is almost at zero too. In movement of any part of the body there is not only co-operation, but antagonism also of muscles or muscular strands (Duchenne uses the expression "co-operation of antagonism"). The antagonist pulls—those against the direction of the displacement to be effected—may be symbolized as minus quantities; the pulls co-operating in that direction as plus quantities. A movement is then not the arithmetical sum of pulls of all the muscles engaged, but the algebraical sum of the pulls. Transferring these ideas to antagonistic and co-operating discharges of nervous centres, we may suppose that what we have called, both for health and disease, the survival of the fittest during a conflict of numerous nervous discharges, is the algebraical sum of what on the physical side are co-operating and neutralizing discharges during the conflict.

arrest of a strong conflict of discharges of numerous nervous arrangements for different words. It is a popular doctrine that strong emotion leads to incoherent utterances, which, I suppose, means the survival of words symbolizing more than one different set of ideas. Strong and suddenly induced emotion may lead to temporary speechlessness; we suppose that temporary speechlessness with great emotion betokens very numerous and strong nervous discharges, conflicting so as to balance or neutralize one another.[1] In some other cases of disease psychical states cease during sudden excessive discharges. An illustration is that during sudden and strong discharges, epileptic discharges, beginning in the very highest nervous arrangements (consciousness), the substrata of consciousness cease.

We now consider the recurring utterance of one word (No. 2, p. 132). Let us first note what occurs in health. Very often under strong and sudden emotion, a normal or usual degree of speech is not possible; some inferior speech is possible. When there is not incoherence, but one word may be uttered or rather exclaimed, as "Fire!" "Help!" the utterance is indeed often a very simple injection, as "Oh." One word, as "Fire!" might in normal circumstances be propositional only or so practically; it might *mean* "there is a Fire," but exclaimed under strong emotion it is also largely of interjectional value. Strong emotion leads to inferior speech, to more automatic, more organized utterance. Figuratively speaking, emotion uses propositions in a largely interjectional manner, that is to say, reduces them to or towards inferior speech. Emotion, as it were, still speaking figuratively, appropriates and subordinates an intellectual utterance. There is at any rate an interjection in the making, in the exclamation "Fire!" "Help!" &c., a degradation of speech (compare swearing). We see in the utterance itself, that with a fall in the intellectual element there is a rise in the emotional one. There may be an equal, no doubt a greater, liberation of energy during these utterances, but it is directed more strongly on the vocal (including respiratory) organs, to those organs which serve especially during emotions. Strong emotion tends to more automatic, inferior utterance.

I suppose, then, that strong emotion, or rather, of course, the nervous discharges accompanying it, may have led in the becoming speechless

[1] Probably there is a more complex condition; during strong emotion, there are rapid and strong discharges on the vital organs which soon lead to exhaustion of these organs; thus there will be a multiplication of effects; the cerebrum, especially its highest centres, will be ill served with blood.

man to so rapid a discharge of so many nervous arrangements of higher cerebral centres, in this case for words, that in the great struggle resulting, the survival of the fittest was a survival, not of the best for the then external circumstances, but of but one word, or of some syllable or syllables: the fittest was then an interjection, or only some parts of sentences or parts of words fused into jargon.

Rapidity of emotion is the great thing in the above considerations. In another way we are concerned with rapidity—with rapidity of the being taken ill, which means rapidity of destruction of nervous arrangements in the left half of the brain.

In all cases of nervous disease we must endeavour to estimate most carefully the element of rapidity of lesions, not only the quantity of nervous elements destroyed, but the rapidity of their destruction. We have to try to estimate the momentum of lesions. We, however, use the term "gravity of lesions." I do not pretend that I can show the bearing of the factor rapidity on symptomatic conditions in cases of affections of speech. It is fair, however, to consider it in this regard to suggest a basis for future investigation. The slowness with which a lesion comes on is determined by the slow onset of the symptomatic conditions; a small sudden hæmorrhage produces greater, but a more temporary effect, provided it does not at once kill, than a large, slowly developed softening. But in the latter the paralysis or other defect depending on mere destruction of the centre is more local and more lasting.

A very sudden grave lesion would render unavailing all external circumstances, and would prevent all emotion, for it would produce unconsciousness at once; a less grave one would prevent the influence of external circumstances, but would develop emotion. A lesion of very little gravity would allow external circumstances to act, but to act quietly and allow clear propositions to be framed. Repeating in effect what has been said, it does not follow that the lesion in the latter case is not an extensive one; the question we are now about is as to the gravity of lesions, metaphorically speaking *mr* of lesions.

We should then note whether the aphasia and hemiplegia are rapidly produced, whether or not there be sudden loss of consciousness, and note also the length of the coma, if there be any. Everybody does this for clinical purposes, in order to obtain empirical evidence of the kind of pathological process, whether it be clot, softening, &c.; but we should use the facts also as regards the interpretation of the kind of recurring utterance the patient may have. Perhaps the bearing of rapidity of

destruction on the nature of recurring utterances is not made evident in the above. It is not here *directly* a question of rapidity of destruction of any centre, or of "shocks" given to centres connected by fibres with the one suddenly damaged, but a question of the indirect effect of rapidity of destruction, of such destruction in so far as it is a *sudden removal of control* (or inhibition) over lower centres. Of course by "lower centre" we do not mean one geographically lower, but one anatomically and physiologically lower. The destruction can only directly *cause* negative symptoms; it neither directly causes the utterance nor interferes with it; it may be popularly said to cause it and to affect it indirectly, but it is better to say it permits it. In so far as cases of aphasia are concerned, the above is hypothetical. Let us consider the principle stated more generally. In other cases of nervous disease rapidity of dissolution is, I think, evidently an important factor with regard to symptomatic conditions. The epileptic maniac is the most furious of all maniacs. Why most *furious?* The fury is the psychical side of what is physically, of course, great activity of nervous arrangements, it is activity of lower nervous arrangements; for as the furious maniac is insensible also, it is plain that his highest nervous arrangements are *hors de combat.* Why, then, are the lower nervous arrangements so active? I believe it to be because the process of dissolution effected in the epileptic paroxysm prior to the mania is the most rapid of all processes of dissolution—control is most rapidly removed. Let me try again to make this clear by formulating it otherwise. We have not only to consider "depth" of dissolution, but the rapidity with which the dissolution is effected—control removed. I believe we may say that the deeper the dissolution, the more general and more automatic are the processes remaining, and that the more rapid the dissolution the more excitable are the nervous arrangements of those processes. So that with shallow and yet rapid dissolution the actions are elaborate and also busy; with deep and rapid dissolution, they are simple and also violent (it is not a question of "importance" of actions).

I presume, then, that the more rapid the destruction of the part in the left half of the brain, the more excitable would be the nervous arrangements in the corresponding undamaged right half, and thus that the activity of it would be greater—greater for some time after the onset of the illness. But the more rapid the destruction, the more quickly there would be loss of consciousness; thus the then external circumstance would be unable to act at all, and although the lower centre might be more excitable than usual, there would be nothing for it to

manifest as a result of what was saying or doing at the onset of the illness.

To recapitulate. By considering (1) the external circumstances at the time of the being taken ill; (2) the intensity of the emotional state under which the last attempt at speech was made; and (3) the gravity of the lesion, we may, perhaps, be able to show why this or that kind of recurring utterance remains in particular cases of speechlessness.

We shall now consider phenomena analogous to recurring utterances in some cases of defect of speech (No. 1, p. 115), in order to widen the basis of investigation.

The patient who has defect of speech may get out a word, right or wrong, and go on uttering it: or he may even get out a proper reply, such as "Very well," and go on uttering that in rejoinder to further questions to which it is irrelevant, being aware of that irrelevance. To use Gairdner's expression, who drew attention to this peculiarity, the patient gets the word or phrase on his "barrel-organ." It becomes a temporary recurring utterance; the permanent recurring utterance in loss of speech may be called permanent barrel-organism. In cases of defect of speech the patient may write a little, and then go on writing the same syllable or word or phrase over and over again. Here, again, is evidence, although indirect, of "barrel-organism" of words or syllables.

The following is a letter written by a patient who had defect of speech: it was not punctuated. He first wrote his address correctly, which for obvious reasons I do not give, I substitute "Hurst Row, North Newington Road" for it; the address recurs in the letter; the factitious address is put in place of it:—

"Dear Sir,—I feel very well just now" ("for now" and "I feel" came next, but are crossed out) "for Hurst Row I feel very well just now for thingg in the first way for the thamk now. I know now I was in the first now in the first now in the Newington Road. I keep you first way in Newington Road the poor way is the best way for me is the best way for me is the best way for me is the best way the way is the best for me for ways kept for me for kept ways kept me for way kept for me."

Here ends the letter. There is, however, plainly something more than barrel-organism in it.

From what would be generally called the physical sphere we obtain illustrations in some cases of *loss* of speech of "barrel-organism." If, after getting an aphasic to protrude his tongue, we ask him to put his

hand on his head, he may, instead, open the mouth and perhaps put out the tongue. This, I grant, may be of doubtful interpretation.

Here let us note another peculiarity in cases of defect of speech, which, perhaps, can only be shown to concern us indirectly in regard to what has been said. It is a very important matter in the elucidation of the nature of defects of speech, and may properly be mentioned now in order to suggest inquiry if there be anything analogous in the recurring utterance in cases of loss of speech. In some cases of defect of speech we find that the patient who has uttered a word or phrase correctly, and who goes on re-uttering it as a reply, cannot repeat it when he is told and when he tries. He has said correctly, "I don't know." We tell him to say "I don't know"; he fails. Whether there is anything strictly analogous to this in the case of permanent barrel-organism Nos. 1, 2, and 3, as there is of "no," No. 4, will not be easy to determine. For if we ask the patient to *say* his elaborate recurring utterance, just as we ask patients who reply "no" to say that word, there is the difficulty that the recurring utterance comes out when they *try* to say anything; and thus its coming out may be not saying it, but simply uttering it as at any other time. I confess I have no personal observation on this matter worth mentioning. It has long been known that some aphasics at least cannot say parts of their recurring utterances. Thus a patient of Bazire's uttered "sapon, sapon," but could never say "sap" or "pon" only. Trousseau makes analogous observations. But here obviously there is a difficulty. What we call part of a word is really another word or syllable. A patient who consulted me for loss of speech learned to *say*—not merely to utter—"Battersea"; but she could not say "batter." When asked to say it, she said "Battersea."

Here we may make further remarks on dual mental action, taking this time not the process ending in ideation or perception, or both, but the process ending in voluntary, as distinguished from automatic actions. What we now say may serve to integrate remarks which necessarily came now and then incidentally in discussing different parts of our main topic. We make a few preliminary observations.

We must bear in mind that "will," "memory" and "emotion," are only the names men have invented for different aspects of the ever present and yet always changing latest and highest mental states, which in their totality constitute what we call consciousness—consciousness being really a name for a series of varying and different consciousnesses. There is, however, a double series, subjective and objective consciousnesses. Each one of the series of object consciousness is secondary to

a state of consciousness or subconsciousness, representing us altogether, subject-consciousness. It is this duplication, I suppose, which gives us the feeling that we have a sort of general and persisting consciousness, and are also now, now, and now, conscious, this or that particular way, and which makes us say that this or that sensation or image comes *into* consciousness, or that we have a sensation and know that we have it.

Taking "will," "memory," and "emotion" to be real independent entities or faculties reminds one of the old woman's remark, "How lucky it was that Adam called all the animals by their right names."

To say a word or proposition when told "for the sake of saying," is not a language process at all. A speechless man's inability to say "no" when told is a thing of the same order as his inability to protrude the tongue when told. The consideration of such facts will help us to classify the phenomena of cases of aphasia on a deeper basis than that of language. To use an expression somewhat loose in this connexion, there is loss of certain voluntary actions in some cases of aphasia, with conservation of the more automatic—a dissolution affecting more than language processes, and affecting language processes not so much as language processes, but as they are some of the voluntary actions. We have to consider speech on this wider basis in order that we may be better able to see how speech is part of mind, and thus to get rid of the feeling that there is an abrupt and constant separation into mind *and* speech.

It is in considering the nature of these phenomena that we see, I think, the bearing of Spencer's remark on the distinction betwixt voluntary and involuntary operations. Where we have to do with quality of mental processes. In the voluntary operation there is preconception; the operation is nascently done before it is actually done, there is a "dream" of an operation as formerly doing before the operation; there is dual action. Before I put out my arm voluntarily I must have a "dream" of the hand as being already put out. So too, before I can *think* of now putting it out I must have a like "dream," for the difference betwixt thinking of now doing and now actually doing is, like the difference betwixt internal speech and external speech, only one of degree; in one there is slight discharge of a certain series of nervous arrangements, in the other strong discharge of that series. The "dream" must occur before I either think of now doing something or before I actually do that thing, just as words must be reproduced in me before either I can say them to myself or aloud. To say that we know what we are going to do, or that we are intending to do this or

that amounts to admitting the above hypothesis. These expressions imply our having a nascent excitation of nervous arrangements representing the parts formerly concerned in doing that which is now to be done again. If we say we are trying to do something, we mean similarly, and so we do if we say we remember how to do anything; there being no "faculty" of remembering an action apart from having the action (as it was formerly doing) again actual, although faintly actual, nascent. To "will," to "know," to "intend," to "try," to "remember," have each, in their several contexts above, the same meaning. They are different names for the subjective reproduction which precedes objective reproduction; they are names for "dreams" of what was once doing and is now to be attempted again. Indeed the simple expressions, "He speaks," "He does so and so," imply the duality; imply objective activity following subjective activity. "He speaks," or "He does," implies a then temporary duplication of a person into subjective and objective, "he" represents that person's whole self of course, and "speaks" or "does," represents something doing by his whole self. "He" represents the whole of him in the stage we have figuratively called having a "dream" of a past operation, "speaks" or "does" represents the whole of him in the stage of imitating it. (We say figuratively, because we do not mean a visual dream, but having again sensations representing parts of the body displaced and as being moved thus or thus.) To take a simpler case, in speaking of which, however, usage will not allow application of the terms "voluntary" and "involuntary," "he has this sensation." Subjectively, there is a sensation arisen in him which associated directly with others and by them indirectly with all others—all that have been organized. Objectively there is disassociation, the sensation is considered separately from all others that are organized and in relation to those now organizing. We may fancifully put the duplication thus: "*He* has it," and "He has *it*"; thus artificially separating what is a rhythm of a subjective and objective state. When then we assert that a speechless man tries to say "no" and fails, we are tacitly affirming that he has the word "no" revived in himself, a "dream" of the word. He has the subjective word "no," but not the objective word "no," there being really two "noes," all words being in duplicate of subjective and objective. So, were we to use popular language, and to say of a patient who "tries" to put out his tongue and fails, or who tries to say "no" and fails, that he has lost part of his volition, we should only mean that he had lost not a part of some faculty but the very objective actions

themselves, their nervous arrangements being broken up; he has lost a part of himself. And were we to say that the patient desires to do those things, we should only mean that he retains the subjective actions, which in health are precedent, and are to him the preconception of the objective actions which cannot follow, for the simple reason that they do not exist. I suppose such expressions of duplication of mental states, "ideas *of* actions," "memory *of* words," "feeling *a* sensation," and "*knowing that we have* this or that feeling," &c., imply that there is first and subconsciously the action, or the word, or the particular sensation associated with (because arisen out of) the already organized in our whole selves (subjective actions, words, &c.), before the second reproduction of them or rather of their duplicates in relation to what is then organizing from the environment. A subjective word is first a centre of association with all other organized words, symbolizing all other images, and afterwards a symbol of a particular image; an objective word is first a symbol of a thing and next acquires new associations with other words, then using along with it and similarly arisen to indicate new relations of things in the environment.

In healthy speech it is hard to see how we can have a proposition (either in the degree of internal or in that of external speech) before the words of that proposition have been subjectively revived. Otherwise, how should we be more than machines? Words must have arisen in us in an order symbolizing states arisen in us, before a proposition we utter can have, *for us*, any meaning as symbolizing external relations of things one to another in the environment. To use popular language, we must first remember the words and then say them.

We do not, as already incidentally implied, mean that the parts of the subjective and of the objective process are arranged in the same order.

Let us return to the simple movement of the arm. The "dream" here begins, of course, with that which corresponds to what is the end of some operation which was actually done on some former occasion. If I am to put out my arm so far I must have a "dream," *beginning with* the hand being so far put out; and next of it as in varying positions up to that state of rest from which the movement really began when it was formerly done. If this was not so, we should not know what we were going to do; the end must come first subjectively, before the objective process can in any voluntary action begin, and can go on to that end. This implies that two different nervous units are engaged. One of the twins represents (*a*) incoming currents from skin stretched, muscles moving or balanced by antagonism from joints, &c.,

in the limb engaged, and (*b*) currents coming from the rest of the body, as being thus or thus fixed, or as thus or thus variously displaced during the particular movement of the limb. And of course there is an accompanying series of outgoing currents, for if there were no motor element we should have no knowledge of the relations of the parts moved to one another and to the rest of the body; incoming currents would not suffice to give this relation any more than incoming currents from retired retinal elements, without accompanying ocular movement, would suffice to give us a knowledge of the relations of these elements one to another; and, plainly, unless retinal elements are first known as out of one another, impression on them by objects would give us no notion of the exterior extension of those objects. Similarly, until we have already a knowledge of the relation of parts of the body one to another, we could not begin to make any movement of part of the body to operate on the environment. During discharge of this unit a psychical state of what was formerly doing arises. When the operation is to be repeated, to be done now voluntarily, the other unit discharges the operation, starting from an attitude of the body and passing on to the end of the operation by the limb. Manifestly this must begin by an attitude of the body, and the progress in the arm will be from the shoulder to the hand, in an opposite order to the "dream-movement." It is during the play of these two movements that what is called muscular sense arises. The psychical side of one process is part of what we call desire, of the other of what we call effort.

That subjective states arise in an order the opposite of that they are arranged in in corresponding objective states, is supported by the analogy of some dreams. A noise develops a dream, but, sometimes at least, the noise, which in reality acts on the sleeper first, is last in the dream it excites. In all dreams provoked by local excitations I suppose the transfigured excitation comes either last or later than the excitation itself. And I suppose that in such a proposition as "gold is yellow," the subjective order is the reverse of the sequent objective order; for our concern is first with the yellowness of gold, not with gold. This view is, I think, in harmony with what was said on transposition of syllables in mistakes of the slightly aphasic and the healthy. I believe there to be a duality also in automatic operations; but in this case the movement has so often followed the dream that the two are nearly equally perfect and easy. The voluntary operation, the prior "dream," is imperfect, or, if perfect, the movement done after it does not imitate it closely; we try to do so, and fail. Becoming automatic

by repetition is, on the physical side, for the two units to discharge more nearly together, because lines of less resistance are established; there is less delay betwixt them, and thus preconception through the discharge of the first unit and less sense of effort during discharge of the second. Thus less and less consciousness attends processes the more they become automatic; subjective and objective actions become, as it were, nearly fused.

Let us now take other kinds of nervous affection which show something analogous to permanent barrel-organism of speechless patients. We wish to point out that there is evidence that operations going on at the time of unconsciousness supervening remain nascent or in abeyance, are not always swept away, during the unconsciousness. During the restoration to consciousness they become active again; on full restoration to consciousness, they cease.

Directly after or in coma from various causes, we occasionally see a reversion to actions doing when the comatosing lesion occurred. An ostler coming round from coma, due to the kick of a horse he was grooming, began to "hiss" as grooms do when engaged in rubbing down horses (Brodie).[1]

Abercrombie writes: "A lady, whose case has been communicated to me, was seized with an apoplectic attack while engaged at cards. The seizure took place on a Thursday evening, she lay in a state of stupor on Friday and Saturday, and recovered her consciousness rather suddenly on Sunday. The first words she then uttered were by asking, "What is trumps?"

I suppose the above instances show that actions nascent at the time when the illness occurred remained so during the coma, and went on again actively when consciousness was being restored; on full restoration to consciousness they ceased, the barrel-organism was temporary, because the highest nervous centres were only temporarily *hors de combat*.

The following case, kindly supplied to me by Dr. Buzzard, has never been published. It may be taken as a faithful record, since the observer's qualifications as a neuropathologist are of the very highest. It is one of extreme value in many ways.

[1] I suppose the following to be analogous, although consciousness was only partly restored; the action of laying the oilcloth had become "barrel-organic." A woman I was asked to see in a surgical ward of the London Hospital, who fractured her skull by a fall when laying down the oilcloth on a staircase, kept, during partial unconsciousness a few hours before death, manipulating the counterpane of her bed. We supposed this to be a continuance of the action of laying the oilcloth; the patient desisted for a time, at least when the nurse assured her "it was properly laid."

"About fifteen years ago, a medical friend of mine, some 57 years of age, was pitched on to his head, owing to the horse which he was riding having put his foot in a drain. He was taken home in a state of profound insensibility, in which I found him very shortly afterwards. From the symptoms it was probable that he had fractured the base of his skull. For some hours (I have no note of the number) he lay in a state of deep coma, incapable of being aroused. From this his condition gradually changed to a state in which he appeared to sleep, but would reply "yes" or "no" to questions put to him. He did not appear to notice anything about him, and never volunteered a remark, but scarcely ever failed to reply in the way described, and with such an amount of propriety that I remembered it was difficult at first to believe that he was unconscious. Offered food, he would sit up in bed, drink it without a word, lie down again and go to sleep. On one occasion I wanted him to take a common black draught, but he appeared to resent this, said "No! no!" fiercely, and turned away. By a little persistence, however, he was induced to swallow it. He would get out of bed, take the chamber utensil out of its place of concealment, and pass urine regardless of anyone in the room.

"One morning, to my astonishment, he got up, walked to his shaving-glass at the window, and proceeded to lather his chin. He then shaved himself, with very fair completeness, and returned to bed. I happen to know that this was the way in which he invariably commenced his morning toilette, for he was a late riser, and he had frequently risen and shaved himself during my visit. From this day he got up every morning about the same time, repeated the operation of shaving, and then returned to bed. The action was performed with the same evident unconsciousness of the presence of others which we see in the somnambulist. Having returned to bed he would lie for the rest of the day in a dozing state, which was only interrupted by his taking food and passing his evacuations, which actions were evidently performed in a purely automatic manner.

"Upwards of a fortnight from the time of his accident he woke up into consciousness, noticed persons in the room, and made some slight remark. Little by little during the next hour or two he began to converse at greater length, referred to circumstances relating to his business which had occurred before his injury, and it became presently evident that the time during which he had been in bed had left no trace upon his memory. Of the injury itself he knew nothing whatever, the last thing which he remembered being that he was riding on horseback.

"When asked the day of the week and month he unhesitatingly gave the date upon which (more than a fortnight previously) he had met with the injury, and became quite angry when assured that he was mistaken. The period of his illness had been cut out, as it were, of his life in the cleanest and most complete manner, and not a trace of it has ever since presented itself to his mind."

In the above-mentioned cases the patients recovered, and thus their cases are not closely analogous to our cases of permanent barrel-organ utterances in aphasia. A patient who recovers soon from aphasia loses his recurring utterance, becomes able not to utter it. These cases are analogous, and so is the temporary barrel-organism of some patients with defect of speech. In the permanent barrel-organism or recurring utterances of patients who remain speechless, the restoration of the part (in the left half of the brain) placed *hors de combat* is impossible; it was destroyed altogether. The following case is more closely analogous to these cases than the above. Abercrombie relates (after Conolly): "A young clergyman, when on the point of being married, suffered an injury of the head by which his understanding was entirely and permanently deranged. He lived in this condition till the age of 80, and to the last talked of nothing but his approaching wedding, and expressed impatience of the arrival of the happy day."

What does recovery in the case of the cures of barrel-organ actions mentioned mean? It means restoration to functions of some or enough of the highest nervous arrangements; it means return of control. But in cases of speechlessness from entire destruction of nervous elements there can be no restoration; the control does not return. The recurring utterance remains, and by repetition becomes highly organized.

WORDS AND OTHER SYMBOLS IN MENTATION.

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When anyone says that words are essential for thought, he may, I suppose, mean that words or *some other symbols* (or both words and other symbols) are so. Pantomimic actions, for example, are symbols analogous to words) and untrained deaf-mutes use these, not only for inter-communication, but also in thought. There are in all men, I submit, actions not reaching the rank of what would commonly be called pantomime, which are symbols in mentation. In all cases it is meant that propositions of symbols (verbal or pantomimic) serve in mentation, evidently to speak is to propositionize. This being said, I may, without misleading, speak of symbols as if they were independent of one another. I use the term "action" for the psychical "side" of what are physically movements.[1]

Since lower animals think, it may be asked, "What are their symbols?" if symbols are necessary in mentation. They have no words, but I submit that they have other symbols—inferior symbols, symbols but little symbolic—which serve in their lowly mentation. This matter I can only deal with after speaking of symbols in the case of man I begin with words.

A word is a psychical thing, but of course there is a physical process correlative with it. I submit that this physical process is a discharge of cerebral nervous arrangements representing articulatory muscles in a particular movement, or, if there be several syllables, in a series of particular movements.

Strictly, no doubt, the physical basis of a word, or rather syllable, is a sensori-motor, an audito-articulatory, nervous arrangement. But in speech, the objective part of verbalizing, our main concern is with the motor element of the physical basis of words. It is current doctrine that the part of the brain destroyed in cases of loss of speech (aphasia) is motor, and that it is a part of cortex cerebri (Broca's region)

[1] There are, I think, also arbitrary image symbols serving in mentation; of this matter I shall speak later.

representative of movements of the tongue, palate, lips, &c. Artificially induced discharge of what in the monkey is homologous with Broca's region, produces movements of the tongue, palate, lips, &c., and so far as we can see, there are no other effects from that discharge. And I suppose no one doubts that very strong discharges of Broca's region in man (such discharges, I mean, as occur in cases of "cortical epilepsy") produce convulsion of the muscles of the same parts; this convulsion is nothing other than a "running up" of many movements of the muscles of the parts mentioned into a stiff struggle. Dr. Charlton Bastian, however, thinks that the whole of the so-called motor region (Rolandic area of the cortex cerebri) is not motor but kinæsthetic. The opinions of this distinguished physician deserve most respectful consideration. Possibly, nearly all I say about what I call the motor part of the physical basis of words, might be accounted for on Bastian's doctrine of kinæsthesis. I continue, however, to speak of Broca's region as motor.

It has been said that cases of aphasia, let us suppose cases of speechlessness, give proof that thought is possible without words. We do not often encounter a case of complete speechlessness; the patient whom we call speechless can nearly always reply by "yes" and "no," and these words so used are, or are in effect, propositions. I shall suppose a case in which a patient can utter these two words, and yet cannot use them, cannot reply with them; he is then completely speechless. I have long ago put forward the opinion that the speechless man is not wordless. There is disease of but one half (left) of his brain, and I submit that there are nervous arrangements, the physical bases of words, in the fellow, undamaged (right) half. Using again the term "verbalizing" to include all services of words, there are at least two ways in which words serve; they serve not only in speaking, but in the reception of the speech of others. In a case of aphasia with word-deafness (a special imperception) there is a loss of receptivity of words, but this is, I submit, because, speaking now of the physical, the nervous arrangements for articulatory movements in the right half of the brain cannot be reached. I am supposing a case of speechlessness without that complication; in this case the patient understands what we say to him, on simple matters at any rate, he receives our speech, has that services of words.[1] Further, the damage to the left cerebral hemisphere

[1] Of course, one does not take the expression "receiving speech of others" literally. We understand a speaker because he arouses our words. When a man "hears voices" (words as if spoken to him) it is obvious that the words are his own words, although often no doubt roused in him by auditory changes which, were he in good health, would only cause noises.

in a case of speechlessness, is, I consider, of a part of the middle motor centres of the cerebral sub-system, the highest motor centres of that sub-system (prefrontal lobes) being intact. I think, then, that cases of loss of speech do not give proof that thought is possible without words. As, however, I am not aware that anyone agrees with me in thinking that the right half of the brain is "educated in words," and as I fear I am alone in making the distinction into middle and highest (cerebral) motor centres, I have no right to claim acceptance of the opinion that such a case of aphasia as that selected does not give proof that thought is possible without words. In some cases of "complete aphasia" there is some power of pantomime, but I think there is less than in healthy men and that in some cases of aphasia it is very much impaired.

I now return to the dictum that the physical basis of a word is an audito-articulatory nervous arrangement, and as I am here dealing with speech and not with other services of words, I consider only the motor part of that basis.

When a man says aloud, "Gold is yellow," or says that to himself, there is correlative with the psychical things (the words of this proposition) discharge of cerebral nervous arrangements for four movements of his articulatory muscles. At the risk of too great iteration, I remark that it is not said that a word is an articulatory movement or discharge of cerebral nervous arrangements for one. The notion that movements or cerebral nervous arrangements for them serve in mentation is grotesque. The statement is that a word, a psychical thing, is concomitant with a movement of the articulatory muscles—properly that it is concomitant with discharges of certain cerebral nervous arrangements representing one or more articulatory movements—and that words serve in mentation. I will remark in another way on this distinction.

We must not say that speaking aloud is a physical process only, and that speaking to oneself is a psychical process only. There is a double process in each. When speaking to oneself, there is a slight discharge of motor cerebral nervous arrangements representing movements of the articulatory muscles, with a correlative faint psychical state; in this case the discharge is so slight that lower centres are not engaged and no articulatory movements are produced. In speaking aloud there is a strong discharge of the same nervous arrangements with a correlative vivid psychical state—in this case the discharge is so strong that lower motor centres are engaged, and finally there are movements of the articulatory muscles in a particular sequence. In a severe case of bulbar paralysis the patient cannot articulate, but he can speak "internally,"

and can write out what he says "internally." The cerebral motor nervous arrangements of Broca's region continue in the case of bulbar paralysis to represent articulatory movements, although the articulatory muscles and their immediate (medulla) centres have disappeared (atrophy); these cerebral motor nervous arrangements have, as they have in healthy men, a psychical "side."

We must not say that, whilst speaking aloud ("external speech") is an objective process, speaking to oneself ("internal speech") is a subjective process; both are objective, there are two degrees of objectivization. And as to images which words symbolize, both ideation and perception are objective processes; they are different degrees of objectivization.

To return to movements and to actions, the supposed psychical "sides" of movements. It may be said that in the case of other movements—I limit attention to those of conduct—there is no psychical "side" to energizing of the motor cerebral nervous arrangements representing them, that, for example, when a man moves his arm there is a physical process only. Yet if it be true that with discharges of cerebral nervous arrangements producing certain movements of the articulatory muscles there are concomitant psychical states, words, it would be remarkable if there were not also psychical states, actions, accompanying discharges of the cerebral motor nervous arrangements which produce other movements (of conduct). Disregarding this, I consider the matter anew. There is, I submit, proof that discharges of cerebral motor nervous arrangements for some movements other than those of the articulatory muscles, have a psychical "side."

When a man's arm is cut off he has a spectral hand. In most cases he can "move" his spectral hand, may try to pick up things with it, can put its fingers in positions he imitates for us with the intact fellow member. I submit that the movement as I called them of the spectral hand are really actions, that is that they are psychical states, concomitant with activities of motor cerebral arrangements which continue ignorantly to represent movements of the lost hand, if I may use that expression.[1] We cannot suppose that the man had not a spectral hand

[1] The amputated man is physically something in the same case as is a man who has complete atrophy of all the muscles of his arm (Duchenne-Aran type of progressive muscular atrophy). I say something, because in the former case the anterior horns are intact, in the latter absent (wasted). And I should imagine that this would make a difference in the definiteness of spectral movements—expecting the movements, properly actions, of the spectral hand in the former case to be more definite than those in the latter. I do not know that there is that difference in the two cases. I do not, indeed, know whether or not there are

before amputation of his arm, and that it appeared only after the operation to remind him of his former entire condition. I submit that all entire men have not only movements of their hands, but also actions—psychical states—correlative with activities of the cerebral nervous arrangements effecting these movements. When a man's arm is cut off, he finds this out.[1]

To repeat *mutatis mutandis* what was said on differences between speaking aloud and speaking to oneself.

When I actually move my hand there is a vivid psychical state or action concomitant with strong activities of motor cerebral arrangements representing the movement; when I think of moving it there is a faint psychical state, or action, concomitant with slight activities of the same nervous arrangements. To take another case. When a deaf-mute is communicating with his fellows, there are strong discharges of cerebral motor nervous arrangements with accompanying vivid psychical states, actions; when he is thinking there are slight discharges of those nervous arrangements, and their accompanying psychical states, actions (so-called "ideas of movements"), are faint; in the former case there

spectral movements in the case of progressive muscular atrophy. I think it likely that there are, because words arise during activities of cerebral nervous arrangements representing absent muscles in the other case of progressive muscular atrophy, that called bulbar paralysis. It would be very difficult to make some patients understand what was meant by asking them if they felt *as if* they could "move" a hand which is evidently useless for any degree of actual movement. The question is one of extreme importance in the anatomy and physiology of the nervous system as they correspond to psychology. The hypothesis is that degrees of definiteness of "projection" (see p. 184) are correlative with degrees of involvement of the motor centres of the cerebral sub-system, from the highest downwards; in detail the supposition is, to illustrate by movements of the arm that, on amputation of this limb, there is most definite "projection"; that in cases of atrophy of anterior horns for the arm, there is less definite "projection," and that there is still less definite "projection" in cases of destruction of the so-called arm-area of the Rolandic region of the cortex. This, as said, is hypothetical, it is only suggested as a method of investigation. "In some cases of impotence of limbs from other causes, there are spectral movements; the other day a hospital patient told to move her toes, tried and could not; she volunteered that she felt as if she did move them when she tried."

[1] I do not mean that these actions, psychical things, are "ideas of movements"; we have, indeed, no ideas of any parts of our bodies. To take another kind of case: a colour is not an idea of activity of any sensory cerebral elements representing the retina; colour is a psychical thing, a sensation, concomitant with the physical thing, activity of certain cerebral sensory elements. Similarly, we have no ideas either of muscular movements or of activities of cerebral motor nervous arrangements representing them, there are actions, things psychical, concomitant with energizing of those nervous arrangements. I cannot but think it important to bear this distinction in mind. Taking another case, it would surely be erroneous to speak of subject-consciousness (self-consciousness or self) as being a consciousness of the whole organism or of the highest centres. No doubt, a very different thing, subject-consciousness is correlative with activities of nervous arrangements representing all parts of the body as one whole.

are actual movements of muscles, in the latter the discharges are too slight to produce actual movements. Suppose the deaf-mute were to lose both arms, he would try to move them, and would then, I suppose, have for himself vivid spectral pantomime during energizing of cerebral nervous arrangements representing the absent muscles of the limbs; the pantomimic actions arising during slighter discharges of those nervous arrangements, would serve in his mentation the same as when he was entire.

I next state an hypothesis as to the evolution of pantomime, beginning with the physical.

I suppose that movements during pantomimic actions (I now limit attention to the pantomime of ordinary men, and do not speak of that of deaf-mutes) have arisen out of what I may call the ordinary movements of conduct. To take a case. I suppose that beckoning (the movement used when signifying that someone is to approach) has arisen out of the ordinary movement, or, I will say, operation, of pulling somebody towards oneself. The operation of pulling was once done, and at length some small and modified part of it comes to stand for that operation, for that out of which it has arisen stands for the movement of pulling someone towards oneself. More generally, some parts of operations come to stand for whole operations.

Of course, when dealing with the movements just mentioned there is, as in other cases, tacit reference to cerebral motor nervous arrangements representing them. As the movement of beckoning arises out of, and comes to stand for, the operation of pulling towards, there must be an evolution of new motor nervous arrangements out of those motor nervous arrangements, the activity of which produces the operation itself. There is, in the cerebral area concerned, more or less detachment and independence of the new nervous arrangements *standing for* the operation from those effecting the operation itself. So far I have spoken of the physical.

It was contended that movements of conduct, for an example the operation of pulling, have a psychical side, and, if so, then, *pari passu* with the evolution of the movement standing for an operation there comes an attendant psychical state, a pantomimic action—a symbol—is the psychical side of energizing of the new nervous arrangements which have been evolved out of those representing the movement of what I called the operation.

When these new nervous arrangements are strongly discharged there are actual movements, and there are concomitant vivid psychical

states, when they are slightly discharged there are concomitant faint psychical states and no actual movements.[1]

When I arrange books on a table there are visual and tactual images, and there are actions. Physically there are imprints on the retinæ and on finger-tips and there are movements of the arm (representing cerebral nervous arrangements understood). Now suppose I think of arranging the books. I have faint visual and tactual ideas, and there are faint actions, and physically there are slight central, cerebral discharges, the peripheral parts not being engaged. In this case the actions are scarcely symbolic, and yet probably to some extent so; so far, at least, as they are not mere repetitions of the former actions, but incomplete and modified reproductions of them. In rudimentary symbols of this class I consider some lower animals think—in symbols the very low homologues of what in man are pantomime—in symbols but little symbolic.

Of course, the separation between pantomimic actions and such actions spoken of in the illustration given (arranging books) is arbitrary; very likely there are degrees from actions simply done over again, not really symbolic, through actions a little detached from those concomitant with the ordinary movements (actions but little symbolic) to those actions so much detached as to be symbols having the rank of pantomime.

It sounds grotesque to say that manipulating and certain other gross operations, or rather the correlative actions, are reasoning, but I think there is reasoning in its lowest form—or that there is at least that out of which what is called reasoning has been gradually evolved. To return to the former illustration. The action during actually arranging books is reasoning in its lowest form; the action when thinking of arranging them is a next higher grade; a purely symbolic arrangement of them in thought, by actions concomitant with activity of new nervous

[1] If this hypothesis be valid, the genesis of words (strictly, of course, the genesis of cerebral nervous arrangements which are the physical bases of words) is accounted for. The nervous arrangements of "Broca's region" represent movements of the muscles of the tongue, palate, and lips. This region represents also (Krause, Horsley, and Semon) movements of the larynx and of the pharynx. It is concerned with the "commonplace" movements of eating, swallowing, &c. I suppose that the motor nervous arrangements of Broca's region, which are correlative with what are psychically words have arisen out of those for the "commonplace" movements of the tongue, palate, and lips, and have become greatly or completely detached from the latter, and then serve, not for their own ends, but stand for operations. They do not, however, stand for the operations out of which they have arisen, but they, the correlative actions, become more widely symbolic. If so, Broca's region in man differs from the homologous part of a dog in there being in it more specialized, new, nervous arrangements in addition to what we may call the ordinary or old ones.

arrangements representing modified parts of the operations, is a sort of reasoning. Certainly when words come to be symbols of the actions (symbols of symbols) in the case supposed there is what is commonly called reasoning.

Words in themselves have no meaning; they are but symbols; it would matter nothing whether a certain small quadruped were called "cat" or "tac"; either would do as a symbol for the image we have when we think of a particular cat. Again, words only come to have speech value when they are in propositions; to speak is to propositionize, it is not merely to utter words.[1] (Similarly, *mutatis mutandis* for pantomimic actions and pantomimic propositions.) Of course, a single word may be, in effect, a proposition, other words completing the proposition being understood, internally revived. Passing over the obvious cases of "yes" and "no," if a father calls to his son "Here," there is in effect the proposition "Come here." Hence speaking is symbolizing a mental operation.

I do not mean that propositionizing occurs only when we speak to tell others what we think, but that it occurs when, so to say, we are telling ourselves what we think. Whether "gold is yellow" is said aloud or whether it is thought that gold is yellow, there is propositionizing, a relating of images to one another in a particular way. But it may well be said that whilst we may declare that there are images of this or that yellow object, there can be no image of yellow in, for example, the proposition just instanced. We have seen this or that yellow object, but no one has seen, and thus can have no image of "yellowness." If so, it may appear that the word "yellow" in the proposition instanced has nothing to symbolize.

I suggest that there is a class of symbols differing in nature from those of words and pantomimic actions, which also serve in mentation. I used to call them "arbitrary perceptive signs," but now "arbitrary images." I submit that when we think "gold is yellow" the mental process symbolized by the proposition is, or rather that the first stage of the process is, thinking that a gold thing is a yellow thing. I imagine that each person has for his fancied general notion of yellowness a particular image of some particular yellow object, and that this image serves him when no particular yellow object is referred to.

[1] To say a word when told to do so is not really a speech process. An aphasic may be able to reply "no" when he cannot say "no" when told. (Strictly to "*say* a word when told" is not a correct expression.)

[2] Strictly speaking, internally or externally, and symbolizing generally, is a relating of images to one another, *and is thus an integral part of mentation.*

Obviously, this is not all. This arbitrary image is associated with other, possibly with all other, images of yellow objects seen and remembered, and from their secondary excitation there is a fancied notion (or concept) of yellowness. The gold thing is grouped with yellow things (classified). The word "yellow" is a symbol of some particular yellow image which is itself symbolic in the sense stated. Of course, I do not mean that we thus get a notion of yellowness; there is no such thing to have a notion of.

I will give another illustration. How, it may be asked, can the word "triangle" in a proposition develop in us the image of a triangle of whose particular shape nothing is affirmed, when actual triangles are dissimilar, equilateral, isosceles, and scalene? I feel that I myself have an image of a particular triangle, viz., an equilateral triangle, which, I suppose, serves in thought for the fancied general notion of triangle. Suppose the following proposition is in question: "The three interior angles of a triangle are equal to two right angles." I cannot but think that everyone who heard and understood this statement would have an image of that kind of triangle, which had, in his experience, been most frequently associated with the word triangle, or of some triangular figure which had struck him. I call this an arbitrary image, because the image of any triangle would serve, and because the image serves intermediately as aforesaid. Suppose the above general statement is altered into the detailed one. "This is true of the equilateral, the isosceles and the scalene triangle." There would then be developed with each name an image of each kind of triangle, and I submit through intermediation of the arbitrary image. (Of course, I do not mean that a man has but one arbitrary image for the fancied notion of yellow; there may be many, they may change; so for all cases.)

Ideation and Perception: Their Resemblances and Differences.

I believe that ideation is commonly regarded as a subjective process; of course perception is recognized as an objective process. I submit that both ideation and perception are objective, two degrees of objectivization. The popular psychologist might aver that in perception there are real outer objects, things in themselves coloured, shaped, &c., things existing outside us and independently of us, and that in ideation there are "only ideas of those real objects." To take a simple case. When

we see (perceive) what all agree to call a brick, there is not, as the popular psychologist supposes, a red-shaped thing outside us and existing so independently of us; the image, the red, square thing we then have, is part of our consciousness, is a ghost of ours. In ideation (thinking of the brick) there is a fainter image than that had in perception. In perception there is as much an "idea of a brick" as there is in ideation; properly the expression is that in each there is an image, the name of which is the word "brick." The idea is a faint percept, the percept is a vivid idea. The image had in ideation is a faint copy of that had in perception.

It is true that to the philosopher as well as to the peasant there *seems* to be in perception a red-shaped thing outside us; it is only a piece of knowledge to the former that there is not, but that there is simply a vivid image in himself. The faint image in ideation seems also to be something outside. I do not mean that it seems to be something present in front of us (it would in certain cases of brain disease even if we were blind). No one can think of what we call a brick except as something not self; there is then a faint image which is part of a remembered or constructed environment, seems in that way something outside.

In ideation the image is not only faint, but is indefinitely "projected"; in perception the image is not only vivid, but is definitely "projected." Of course, I do not mean by using the term "projected" that the image, part of our consciousness, is, or is also, something outside us; the term is only a device for expressing the "*seeming*" spoken of: extrusion of the image is not meant.[1]

Perhaps, in spite of what has been said, the rapid reader may, from the mere use of the word "image," infer[2] that it is inconsistently held that in perception there *is* a red-shaped thing outside us which, so to say, photographs its redness, shape, &c., on us, and thus gives us its redness shape, &c., and thus makes our image. There is no such contradiction. Images and all other states of object-consciousness come out of subject-consciousness, are not straightway produced by agencies of "real" outer objects upon us. It is not meant that in perception there is not some-

[1] There are degrees of *seeming* "exterioration" or "projection" of images (see footnote to spectral movements, p. 178); the degree of definiteness of this seeming is, I think, proportionate to the extent downwards of the discharge beginning in cerebral motor nervous arrangements. (No explanation is intended here.)

[2] He might infer this because in the article preceding this appendix I use the expression "imprints on the retinæ." I would be pedantic to do otherwise in a passing illustration.

thing outside us, but that we have no knowledge of what that something is, except a belief in its existence. The *first* thing in that process the *end* of which is perception, is the action of this assumed external something, x, on us; in perception an image, a, is *forced out of us*, out of subject-consciousness; there is a revealing of self, consequent on the action of x. And of course, although one uses the expression "*the* image" this or that person's image is meant, what the external something can arouse in this or that person. In ideation there is a faint revival of the image had in perception, best considered when dealing with the correlative physical processes of the two degrees of objectivization.

The cerebral centres for ideation and perception are one and the same; during ideation there are only central (cerebral) activities, and these are slight; during perception the activities are periphero-cerebral and centro-peripheral, and are strong. In ideation there is a slight discharge of the same cerebral nervous arrangements which were strongly discharged during perception; correlative with this slight discharge is the faint image, the copy (not of a "real" outer object), a faint revival of the image had in perception. Ideation always precedes perception; perception does not always follow ideation.

We have spoken of two differences between ideation and perception: (1) Faintness and vividness of images; (2) indefinite and definite "projection" of these images. There is another difference, (3) in ideation the faint image is associated with numerous formerly acquired faint images; in perception the vivid image is associated with fewer formerly acquired faint images and is associated with vivid images now experienced. Ideation and perception are objective processes differing in triply compound degree.

There is, I hope, no implication in the foregoing that "the mind combines or associates, &c.," images or any mental states; they come out of subject consciousness in this or that association, in this or that combination.

I hold that the images (illusions) in cases of insanity are objective. An insane man's "illusions" are his perceptions; his "delusions" are his beliefs; most generally his symptoms are, or are samples of, his mentation which is the lower homologue of his mentation when sane. Whether a sane person sees a man in the corner of his room, or dreams that a man is in that corner, his mental state is objective. Were he to become insane—I will, however, take a real case: A girl under my care for intracranial tumour, became quite blind (quite deaf too), and later insane. One of her illusions (or perhaps I should here say hallucinations)

was that there was a man in the corner of her room who mocked her. I submit that this girl's "illusion" was her perception; it was what should have been her morbid ideation, but because certain arrangements of her visual centres were strongly discharged, the image this blind girl had rivalled in vividness, &c., the perceptions she had when well. It may be said that this doctrine confuses reality and unreality. But what reality and whose reality? The mocking man was the poor girl's reality; she took a poker to strike him.

BIBLIOGRAPHY OF PAPERS ON AFFECTIONS OF SPEECH BY DR. HUGHLINGS JACKSON ARRANGED CHRONOLOGICALLY.

1864.

[1] "Chorea with Paralysis affecting the Right Side; Difficulty in Talking," *Lancet*, 1864, vol. ii, p. 606.

[2] "Loss of Speech with Hemiplegia of the Left Side: Valvular Disease; Epileptiform Seizures affecting the Side Paralysed," *Med. Times and Gaz.*, 1864, vol. ii, p. 166.

[3] "Epileptic Aphemia with Epileptic Seizures on the Right Side," *Med. Times and Gaz.*, 1864, vol. ii, p. 167.

[4] "Clinical Remarks on Hemiplegia with Loss of Speech: its Association with Valvular Disease of the Heart," *Med. Times and Gaz.*, 1864, vol. i, p. 123.

(A report of a visit to the National Hospital with Dr. Hughlings Jackson).

[5] "Loss of Speech: its Association with Valvular Disease of the Heart, and with Hemiplegia on the Right Side; Defects of Smell: Defects of Speech in Chorea; Arterial Lesions in Epilepsy," *Clinical Lectures and Reports from the London Hospital*, 1864, vol. i, p. 388.

(Out of print. Reprinted on p. 28.)

[6] "Hemiplegia on the Right Side with Loss of Speech," *Brit. Med. Journ.*, 1864, vol. i, p. 572.

1866.

[7] "Clinical Remarks on Emotional and Intellectual Language in some Cases of Disease of the Nervous System," *Lancet*, 1866, vol. i, p. 174.

(Report of a visit with Dr. Hughlings Jackson to the London Hospital. Demonstration of a case of right hemiplegia and aphasia. The integrity of emotional language as shown by the patient's ability to swear, and the destruction of his intellectual language, the loss of power to form a proposition, were clearly demonstrated.)

(Reprinted on p. 43.)

[8] "Notes on the Physiology and Pathology of Language," *Med. Times and Gaz.*, 1866, vol. i, p. 659.

(Reprinted on p. 48.)

[9] "On a Case of Loss of Power of Expression," *Brit. Med. Journ.*, 1866, vol. ii, pp. 92 and 326.

(Account of an epileptic who was convulsed on the left side without disturbance of speech and on the right side with speech defect. An interesting description of letters, copying, and a list of mistakes in speech of this patient.

The second paper gives an admirable account of how such a patient copies, making no mistake, but never losing sight of his copy.)

[10] "A Case of Disease of the Left Side of the Brain involving the Corpus Striatum, &c.: the Aphasia of Trousseau," *Lancet*, 1866, vol. ii, p. 605.

(Demonstration on a case (with autopsy) of loss of speech with right hemiplegia.)

[11] "Clinical Remarks on Cases of Temporary Loss of Speech and Power of Expression (Epileptic Aphemia? Aphasia? Aphrasia?) and on Epilepsies," *Med. Times and Gaz.*, 1866, vol. i, p. 442.

[12] "Remarks on Cases of Disease of the Nervous System in which Defect of Expression is the most striking Symptom," *Med. Times and Gaz.*, 1866, vol. i, p. 659.

[13] "Inability of Speechless Patients to execute certain Movements" (Addendum to paper), *Med. Times and Gaz.*, 1866, vol. i, p. 659.

[14] "Hemiplegia of the Left Side with Defect of Speech," *Med. Times and Gaz.*, 1866, vol. ii, p. 210.

1867.

[15] "Remarks on the Occasional Utterances of Speechless Patients," *Lancet*, July 20, 1867, vol. ii, p. 70.

(Report of a visit with Dr. Jackson to the wards of the London Hospital. A short account is given of the patient whose stock utterance was "Jimmy." Some other similar cases are mentioned, and Dr. Jackson gave his views on the origin of jargon.)

1868.

[16] "Aphasia with Hemiplegia of the Left Side," *Lancet*, 1868, vol. i, pp. 316 and 457.

(This is the case in which Dr. Hughlings Jackson showed that loss of speech in left-handed persons was accompanied by left hemiplegia.)

[17] "On the Physiology of Language," *Med. Times and Gaz.*, 1868, vol. ii, p. 275, and *Med. Press and Circular*, 1868, vol. ii, p. 237.

(These are almost identical synopses of Dr. Hughlings Jackson's address before the Section on Biology of the British Association for the Advancement of Science, held at Norwich in July, 1868. Reprinted on p. 59. A much shorter report appeared in *Brit. Med. Journ.*, 1868, vol. ii, p. 259.)

[18] "Notes on the Physiology and Pathology of the Nervous System," *Med. Times and Gaz.*, 1868, vol. ii, p. 526.

(Reprinted on p. 65.)

1869.

[19] "Certain Points in the Study and Classification of Diseases of the Nervous System."

(The Goulstonian Lectures delivered before the Royal College of Physicians in 1869. These lectures were miserably reported in the *Brit. Med. Journ.*, 1869, vol. i, pp. 184, 210, and 236; and in the *Lancet*, 1869, vol. i, pp. 307, 344, and 379.

The second lecture was devoted to defects of speech. We reprint (p. 72) the account in the *Lancet*, which is just sufficient to show the intense interest this lecture must have had for us in the present day. But the views of the newly made Fellow of the College of Physicians were not considered of sufficient importance for more than the briefest report.

The Archives of the College of Physicians and the private papers of Dr. Jackson contain no report of these lectures.)

1870.

[20] "Speech Defects in Healthy Persons and Remarks on Utterances of Speechless Patients," *Brit. Med. Journ.*, 1870, vol. ii, pp. 459-460.

1871.

[21] "On a Case of Hemiplegia with Loss of Speech," *Med. Times and Gaz.*, 1871, vol. i, p. 703.

(Dr. Hughlings Jackson intervened in a discussion at the Clinical Society. The report is of no interest to-day.)

[22] "On Epileptiform Attacks commencing in the Right Hand," *Med. Times and Gaz.*, 1871, vol. ii, p. 767.

1872.

[23] "On a Case of Defect of Speech following on Right-sided Convulsion," *Lancet*, 1872, vol. i, p. 72.

(Report of a case referred to in the "Mirror" of the *Lancet*, March 18, 1871. Curious case of a young woman who had a seizure, from which she recovered entirely.)

1873.

[24] "On the Anatomical and Physiological Localization of Movements in the Brain," *Lancet*, 1873, vol. i, pp. 84 and 162.

(The first half of this paper, reprinted on p. 75, throws important light on Dr. Hughlings Jackson's views on speech and its disturbance from lesions of the brain. He deals with emotional and intellectual speech, "verbalizing," internal speech and the power of forming propositions.

The second half contains nothing about speech defects.)

1874.

[25] "On the Nature of the Duality of the Brain," *Med. Press and Circular*, 1874, vol. i, pp. 19, 41 and 63.

(Reprinted on pp. 80, 87, 96.)

[26] "Temporary Affection of Speech (Aphasia), 'Aphasic' Writing," *Brit. Med. Journ.*, 1874, vol. i, p. 574.

(A case of repeated cerebral vascular attacks with aphasia and agraphia. A specimen of handwriting is given.)

[27] "A Case of Right Hemiplegia and Loss of Speech from Local Softening of the Brain," *Brit. Med. Journ.*, 1874, vol. i, p. 804.

(Case of embolic hemiplegia with aphasia in a man, aged 28. An excellent report of what he could and could not say, with a good account of the *post-mortem* appearances.)

1876.

[28] "Case of Cerebral Tumour without Optic Neuritis and with Left Hemiplegia and Imperception," *Roy. Lond. Ophth. Hosp. Reports*, 1876, vol. viii, p. 434.

1878.

[29] "Remarks on Non-protrusion of the Tongue in some Cases of Aphasia," *Lancet*, 1878, vol. i, p. 716.

(Reprinted on p. 104.)

1879.

[30] "On Affections of Speech from Disease of the Brain," *Brain*, 1879, vol. i, p. 304.

(Reprinted on p. 107.)

[31] "On Psychology and the Nervous System," *Med. Press and Circular*, 1879, vol. ii, pp. 189, 239, 283, 409, and 429.

(Here he states his views on psychology, and utters a warning against the fallacious terms in use at the time. One paper is devoted to what he understood by Subjective and Objective, another to Ideation and Perception.)

1880.

[32] "On Aphasia with Left Hemiplegia," *Lancet*, 1880, vol. i, p. 637.

(The case of a left-handed sailor with aphasia and left hemiplegia; he could copy and write to dictation but could scarcely write at all spontaneously.)

[33] "On Affections of Speech from Disease of the Brain," *Brain*, 1880, vol. ii, pp. 203 and 323.

(Reprinted on pp. 130 and 147.)

1884.

[34] "On Evolution and Dissolution of the Nervous System," The Croonian Lectures for 1884, *Lancet*, 1884, vol. i, pp. 555, 649 and 739; *Brit. Med. Journ.*, 1884, vol. i, pp. 591, 660 and 703.

(We have not reprinted these lectures because they are not directly concerned with affections of speech. But they enunciate the general laws which govern the activity of the central nervous system, and contain many instances drawn from disorders of speech.)

1887.

[35] "An Address on the Psychology of Joking," *Lancet*, 1887, vol. ii, p. 800.
(*Proceedings of the Medical Society*, 1888, vol. xi, p. 1.)

1893.

[36] "Words and other Symbols of Mentation," *Med. Press and Circular*, 1893, vol. ii, p. 205.

(Reprinted on p. 175.)